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Principal Contents:

	PAGE
Patchy Lighting. By C. W. Sully	822
Improved Voltage Regulation. By E. T. Norris	823
Special-purpose "Talkie" Equipment	824
Radio Apparatus and Change-overs. By R. H. Cobbold	825
A Sand-pit and Brickfield	826
Electricity Supply in Jersey	827
The O.L.A. Summer Outing	828
Electric Cooking Technique. By Penelope Warrender	829
The Liverpool Convention	830
The Paris Fair	831
Single-phase Capacitor Motors	832
Correspondence: Institution Membership; What is Ohm's Law?; Dangerous Wiring Methods; A Woodpecker's Wicked Work; Electrical Contracting Troubles; Industrial Supplies	833
New Apparatus and Devices	835
"What Lancashire Says . . ." By V. W. Dale	837
"Nursing" the Consumer. By A. G. Connell	838
Parliamentary News	839
Business and Industrial Notes	840
Electricity Supply	843
Traction	845
Communications	845
Contract Information	846
Notes	847
Our Personal Column	848
New Companies Registered	850
Returns of Electrical Companies	850
City Notes	851
Stocks and Shares	851
Published Specifications	853
New Work for Contractors	854

Distribution Practice

THE present tendency to consider distribution in terms of increased sales of energy and appliances has somewhat obscured the importance of the technical problems that have a very definite bearing on the provision of a "cheap and abundant" and, we would add, a reliable supply of electricity. Without the basis of a sound engineering scheme of distribution the most attractive tariffs, all-embracing hire schemes, and prompt service will fall far short of the mark.

Foresight and imagination are probably the two outstanding qualities called for in laying out a network in a manner that approximates most closely to the requirements of Kelvin's law. Thus the distribution engineer should be able to envisage the effect of new load centres on voltage drop, copper losses, and the location of sub-station sites if ultimate efficiency is to be secured.

Yet a scheme that may be technically unexceptional, having regard to local conditions, may not be the best in the broadest sense. Indeed, the chief trouble is that we have too many kinds of sound schemes. It may be easy to prove, for instance, that cables having copper of a certain cross-sectional area can be justified to meet reasonably anticipated demands, but they may entail the manufacture of a greater range of sizes and so help to send up the cost of cables generally.

The needlessly large number of conductor sizes that exists to-day is only one of the items that increase manufacturing costs, and it is surely incumbent on those who believe them to be necessary to give their reasons. The failure to take the opportunity to do so during the discussion on Mr. L. Romero's paper at Liverpool was disappointing, as it is the engineers with experience of day-by-day operation who are best entitled to speak—if they will.

Discrepancies in practice cannot all be due to undertakings having "just growed." We should like to have heard, for instance, whether the difficulties of changing to 230 V from 240 or 220 V, by the hundred or so undertakings supplying a.c. at these pressures, are regarded as insuperable. What is the opinion of mains engineers regarding the use of non-armoured cable in the streets of large towns, or the need for protective covers for armoured cables?

Some effort might have been made to reconcile the diametrically opposed views of Mr. Romero and Mr. J. G. Statter regarding the merits of l.v. fuses and circuit-breakers. It would have been interesting, also, to obtain a comparison of opinions on the effect on voltage regulations of giving single-phase supplies up to 15 kW. These are only a few of the points that would have been worth discussing at some length.

The scope for increasing efficiency in distribution is now far greater than it is in generation. It presents a more difficult task if we include in the term—as we must—the wisest capital outlay. If we had a yardstick for comparison between undertakings as convenient as thermal efficiency is for power stations, a healthy rivalry would work wonders.

An Electrical Mining Exhibition

WHAT promises to be an impressive exhibition of electric mining equipment is being brought together at Newcastle-on-Tyne for the first week in July. It is being arranged in connection with the annual convention of that representative organisation, the Association of Mining Electrical Engineers, which opens at Whitley Bay on Wednesday, July 4th, and continues until July 6th. The exhibition, which will have an area of approximately 15,000 sq. ft., will be situate in close proximity to the Dunston power station of the North Eastern Electric Supply Co. The event is one of some importance, as may be gathered from the fact that fifty-three electrical and other firms interested in colliery equipment are taking part. We understand that about 3,000 colliery directors, and officials of all grades, resident in Northumberland, Durham and Cumberland, are being personally invited to attend. Visits to the Dunston power plant

and to the Hebburn (Reyrolle's) short-circuit testing plant are included in the programme of the Convention.

The Coiled-Coil Lamp

THE new coiled-coil lamp, an advance sample of which we saw a few days ago, will do much the same for interior illumination as the discharge lamp will do for public lighting, *i.e.*, give more light for the same consumption of energy. The improvement in efficiency —20 per cent. in the 40-W size, which will be available within the next three or four months—will not be so striking as for the discharge lamp, but it will affect a far greater number of individuals. The main difference in design is in the coiling of the coiled filament upon itself, so as to reduce its heat losses. Proposals are afoot for definitely planning lighting developments several years ahead, and some useful data will be found in the new pamphlet, "Load Building with Light," just issued by the Lighting Service Bureau. The new lamp will be a powerful ally in this campaign.

Time and Money

ONE of the results of grid interconnection and frequency standardisation may well be a new respect for punctuality (and with it accuracy), since electric time-keeping makes it a virtue easy to acquire. Time is now wasted by leaving margins in hand to catch trains or to keep appointments, and as time is money any saving has a definite economic value out of all proportion to the cost of the clocks. The small amount of energy consumed in performing so obvious a service for 8,760 hours in every year should be a big aid to the supply engineer in his efforts to lay the bogy that electricity is expensive by proving that it is not necessarily so.

The Two Aspects

THE tributes paid to Mr. P. J. Robinson at the I.M.E.A. dinner on account of the performance of his Clarence Dock station (which has achieved a thermal efficiency of over 26 per cent.) were well deserved. We think, however, that an even better testimonial to the work of "P. J.," and one that relates to a more essentially valuable public service, is to be found in the all-electric municipal houses in Liverpool. An average consumption of about 5,500 kWh per annum indicates that electricity and appliances are provided on terms within the means of the poorest.

Chloride Prosperity

MR. W. S. NAYLOR'S speech to shareholders of the Chloride Electrical Storage Co. last Friday consisted mainly of a popularly told story of the thousand and one ways in which the electric storage battery touches our modern life. At practically every turn it is waiting to render service in some form or other, and all the signs point to our growing dependence upon it. Emergency lighting sets, for which a demand has rapidly sprung up in recent years, are constantly finding some new field for service. The company has conservatively taken advantage of its prosperity and increased profits to strengthen the financial position—£125,000 has been put to general reserve. The highly organised selling and service arrangements of the company naturally have much to do with its success. In this connection it may be said that the meeting of "Exide" service agents is one of the most successful trade conventions of the year. Representatives will be going to Scarborough next week for this year's fraternisation and talks about business.

A Talk on Russia

AT the Batti Wallahs' luncheon on Wednesday, the principal speaker was Mr. H. E. Metcalfe who has been associated with Russia for over thirty years in the interests of Messrs. Babcock & Wilcox. He described some of the changes which have taken place during the Soviet regime, which he believes has come to stay. He has seen the great industrial drive made by Stalin and has evidently been impressed very much with the experiment and its possibilities for British manufacturers. Mr. Metcalfe thinks that Russia is the greatest potential market in the world and fears that American and Continental nations are attempting to entrench themselves in that market. He could not describe the country as prosperous, but it was very well ordered. He believed that Russia would become a great country with a balanced budget, no unemployment, and economic independence. The young people especially were making extraordinary progress in technical knowledge in all its branches and they were determined to protect themselves from foreign interference. If they returned to capitalism and re-entered the world market they would impose a tremendous pressure. The new trade agreement recently concluded between Britain and Russia would enable much more to be done by both sides than they had done hitherto. Russia had enormous resources and much better trade could be done if there were better understanding between the two countries, which should also help to correct the impression that was growing that Britain was commencing to lag behind America and Germany technically and in capacity.

Rupturing Capacity

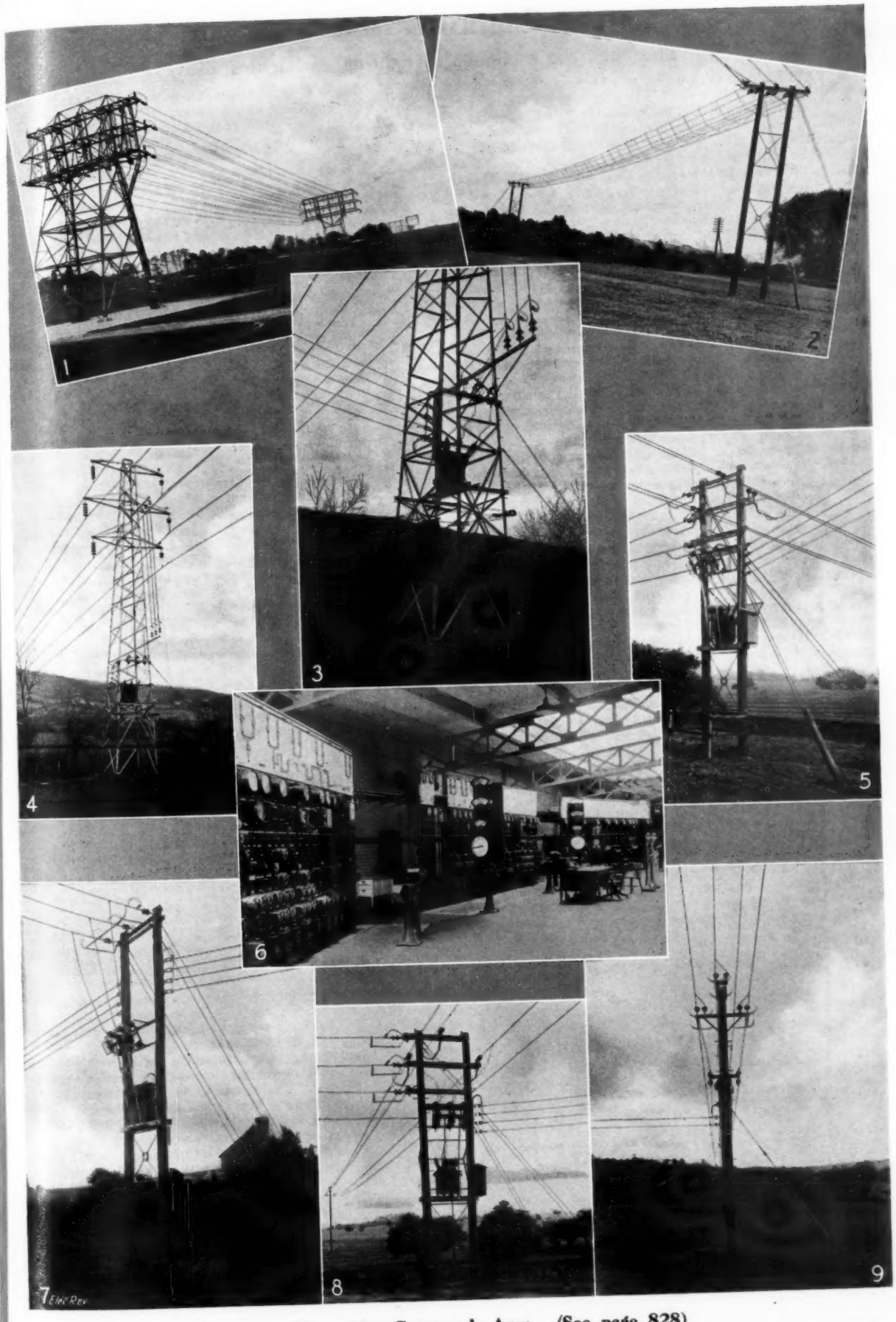
WE were surprised to hear from Mr. W. H. Clothier last week that so far only two municipalities have availed themselves of the Hebburn circuit-breaker testing plant. This does not augur well for a full use being made of a national proving house if we ever get one; but the important thing for the moment is that every opportunity should be taken to acquire data regarding the severity of the conditions at making as well as at breaking circuit from tests at a plant specifically designed for this purpose. What is really meant by the kVA rating of switchgear? Not only does the interpretation differ as between manufacturers, but also spot tests are compared with those carried out over perhaps months. We need a uniform basis for testing before the term "kVA rating" has the definite meaning that should be attached to it.

The Planté Centenary

CELEBRATIONS are to be held in Paris on June 12th, 13th, and 14th to mark the centenary of the birth of Gaston Planté, who is regarded in France as the pioneer of the electric secondary battery, or accumulator. Planté was born in Orthes in April, 1834. It was in 1859, after studying at the Sorbonne, Paris, that he commenced his studies of the polarisation phenomena and of secondary currents that had been observed as long ago as 1801 by Gautherot and Ritti. These studies resulted in the production of the Planté lead battery and, by the time of his death in May, 1889, had wrought remarkable changes in the world of electricity. Next week's celebrations are being organised by a committee of representatives of numerous scientific and technical associations, headed by the President of France.

Car-miles and Seat-miles

THE most notable feature of any tramway system on which ancient and modern cars co-exist is not so much the improvements in comfort and quiet running that have been achieved in recent years (though these are obvious enough) as the much greater seating capacity of the more recent vehicles. Yet their energy consumption and maintenance costs are still worked out on the old car-mile basis. This provides comparisons that are entirely misleading and which may prejudice the case for the tramcar, with its eighty seats in some towns, against the petrol bus. The car-mile basis is also unfavourable to the trolley-bus, which is now built to carry as many as seventy-four passengers. The advantage of the tramcar largely rests on its ability to deal with urban traffic above a certain density more conveniently than any of its rivals; this is bound up with the seating accommodation provided, to which standing room in rush hours also bears a relation. The proper basis for official statistical comparison is the seat-mile—not the car-mile.



In the Shropshire Company's Area. **(See page 828)**

1. Six-circuit river crossing at the Stourport power station. 2. A G.P.O. guard on an 11-kV road crossing. 3. Detail of 11-kV tapping gear. 4. A 66-kV and 11-kV double-circuit steel tower line. 5. A typical farm tapping from an 11-kV line. 6. The control room of the Stourport station. 7. An 11-kV pole-mounted transformer for a rural tapping. 8. Branch taken from an 11-kV line. 9. A pole-mounted transformer supplying isolated premises.

Patchy Lighting. By C. W. Sully

The need for a change in lighting authorities' ideas

NATURE'S illuminants whether by day or night, whether provided from a single source such as the sun or moon, or from numberless sources such as a whole firmament of stars, produces an even light on all visible objects. With artificial illumination, however, throughout the centuries, its particular and most consistent defect has been its patchiness.

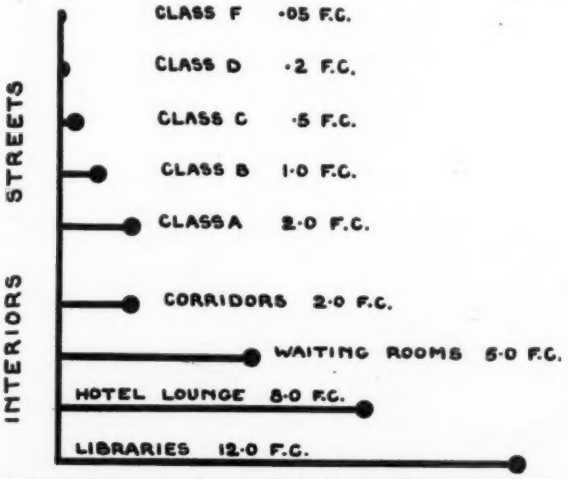
If patchiness is an apt description of internal artificial lighting, it is even more applicable to our efforts at outside artificial illumination, which embraces sign lighting, decorative lighting, and street lighting—the greatest of these being street lighting. Sign lighting must be patchy to a certain extent owing to its requirements being strictly localised. Signs are usually installed at irregular intervals in our streets and vary in nature and visibility, causing danger by glare, by the effect on acuity of vision, or by misleading due to colour. The most modern and effective signs avoid most of these objections.

Decorative lighting is seldom intensive in design and therefore produces less cause for complaint; its development, however, has been handicapped by the persistent practice of using strings of lamps instead of floodlighting the buildings or scenery which are the real decoration of the locality treated. Millions of people were attracted by the temporary floodlighting during the 1931 celebrations, tens of thousands of people appreciate the permanent floodlighting effects of Edinburgh Castle and other buildings which have since been treated similarly in various parts of the country, thousands of people turn out to see the buildings which are floodlighted when the Lighting Service Bureau touring demonstration van pays a visit to our smaller towns.

The Difference Between Lights and Lighting

The increased attractiveness is due to that which is seen being *not* the lights themselves but the architectural features of the building, which are the more noticeable when set against a dark background. Floodlighting is equally effective when applied to foliage and other scenery. Gardens—whether public or private—are not beautified by strings of coloured lights, whereas the beauty and life of their foliage can be readily enhanced by comparatively small units of lights when applied as floodlights. Have you not noticed when motoring along a narrow country lane with your headlights on, especially if they have "daylight" bulbs, how picturesque is the surrounding foliage? That result has been obtained with not more than 72 watts.

In street lighting, patchiness is so common that the powers-that-be appear to have forgotten such a condition is possible,



A comparison between recommended illumination values for the lighting of streets and interiors

much less objectionable. The E.D.A. Street Lighting Committee mentions in its report that the Public Health Act of 1875 gives power regarding street lighting only to boroughs and urban councils. Rural districts have to exercise their powers under the Lighting and Watching Act of 1833. So the public lighting of all our thoroughfares to-day is controlled by Acts passed 60 or 100 years ago. Our population has nearly trebled since the first Act became law and has increased by more than 70 per cent. since the date of the second Act. We had no fast-moving vehicles on our roads sixty years ago; now there are two million licensed automobiles.

Our pedestrians, who experienced little encouragement to use the streets after dark in those earlier days, are now persuaded to do so by the existence of some 4,500 cinemas and over sixty greyhound racing tracks. Many of our shops have taken advantage of this changed situation by continuing to light their windows after shopping hours, but most of our highway lighting to-day is mounted on similar posts and at the same spacing as was employed when our road vehicles were fitted with lanterns carrying candles. The use of streets by motor vehicles has forced the latter to increase the candle power of their lights a hundredfold in order to lessen the danger to other users of the street. The public also have accustomed themselves to increased illumination indoors, often using multiples of 60 or 100-W lamps in their living rooms, which makes the danger by contrast all the greater when they move out into streets illuminated with nothing more than "beacon" lights.

[*Haines*

Mr. C. W. Sully is Director of the Electric Lamp Manufacturers' Association

Outdoor lighting in central areas demands illumination akin to that employed indoors to-day in respect of intensity and evenness. It is wasteful to employ large units without suitable directive fittings to ensure a uniform distribution of the light. The new British Standard Specification makes a special feature of this by setting out a spacing ratio for street lights which encourages a more even distribution of the light and demands either higher or more posts. The amount of illumination required in any particular street depends upon the use of that street and it is unfortunate that the Specification gives no clear guidance in that matter.

Messrs. Waite and Jones in a paper presented to the I.M.E.A. Convention in 1932 gave the following table as a guide to the use of this Specification. This is a step in the right direction, but the minimum foot-candles specified are still too low for modern needs compared with the foot-candles used in modern interiors.

Minimum Recommended Illumination		Street.
Class.	Foot Candle.	
B	1.0	Important central thoroughfares in large cities (spectacular lighting); important central traffic crossings, circuses, &c.
C	0.5	Main roads in central areas and large cities; important commercial thoroughfares in central areas of large cities; important central thoroughfares of smaller towns.
D	0.2	Important commercial thoroughfares not in central areas of large cities; important commercial centres in smaller towns.
E	0.1	Shopping areas in small towns and suburbs.
F	0.05	Main suburban roads with through traffic.
G	0.02	Residential thoroughfares with through traffic.
H	0.01	Residential roads with no through traffic.

Patchy illumination can only be conquered by controlling and increasing the amount of light. Nothing less than 200 W per post should be employed for street-lighting purposes to-day, and it is only when still larger units are employed that we attain an absence of patchiness which materially assists all users of the road. The mounting height can then be raised sufficiently to ensure a fairly even distribution on the road surface, many of the best examples being found where the newest types of electric discharge lamps are employed.

The time has arrived when the Government should allot to one of its numerous departments the task of specifying the minimum light to be provided on the various roads which it has already classified. The other week when, in the Standing Committee on the Road Traffic Bill, it was pointed out that the system of road lighting throughout the built-up areas in this country was most unsatisfactory and means should be considered of improving it, the Minister of Transport stated that he was in substantial agreement with the views expressed and was considering whether, at another stage or by other methods, it might be possible to raise the whole question of lighting.

It has to be noted, however, that Mr. Oliver Stanley's Department was non-existent when the controlling Acts were formulated and it therefore appears imperative to introduce new legislation to deal with the important matter of modern highway lighting.

Improved Voltage Regulation. By E. T. Norris, M.I.E.E.

THE principle of operation and the general features of the moving-coil regulator have already been described (ELECTRICAL REVIEW, December 9th, 1932, and March 3rd, 1933). In its original form many regulators have been put into service satisfactorily during the past two years. It is the purpose of this article to describe a new type of construction which results in improvements in many directions. The principle of operation remains unchanged.

[Lafayette

Mr. E. T. Norris is chief designer to Messrs. Ferranti, Ltd.

The regulator consists essentially of a laminated transformer core with coils *a* and *b* (fig. 1) mounted respectively at the top and bottom of one leg and a short-circuited coil *s* which is free to move up and down the leg between coils *a* and *b*. The moving coil *s* is entirely isolated electrically so that no flexible connections, slip rings, or sliding contacts are required. If a voltage be applied across the coils *a* and *b* connected in series, the voltage across each will depend upon their relative impedances which in turn are determined by the position of the coil *s*. With the values assumed in fig. 1 and an impedance variation of twenty to one the voltage across coil *b*, for example, can be varied smoothly and uniformly from 5 to 95 V by movement of the coil *s*.

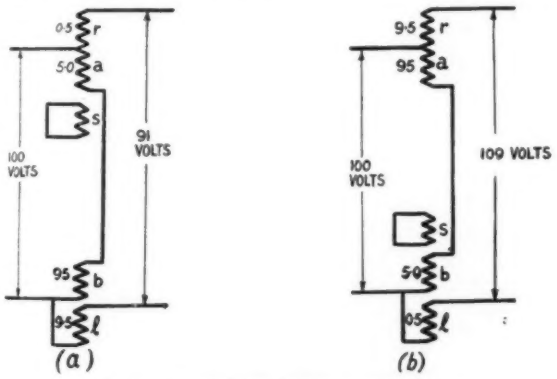


Fig. 1.—Connections of the new regulator

The smaller voltage variations required in transmission and distribution circuits are obtained by means of boosting and bucking coils *r* and *l* mounted in close electromagnetic association with one or other of the fixed coils *a* and *b*. In fig. 1, for example, a voltage variation of ±9 per cent. results from coils *r* and *l* each having one-tenth of the turns of coils *a* and *b*. Other arrangements giving any desired values are described in the articles referred to above.

Method of Construction

In the construction hitherto adopted the core and coils are rectangular in shape and the coils are assembled in sandwich formation, as shown in figs. 2a and 3. This arrangement was originally chosen because in the absence of manufacturing experience the technical performance could be calculated with greater certainty from formulæ established in power transformer design. The chief disadvantages are that reactance relations between the various coils are not so efficient as they might be, and, since the motion of the moving coil is at right angles to its largest dimension, a great deal of free and otherwise waste space is required in the window of the core for this movement.

In the new construction the coils are circular in shape and are assembled concentrically on the core as shown in figs. 2b and 4. The moving coil is outermost to facilitate mechanical operation. The improvement due to this arrangement will be obvious from fig. 2, showing sectional elevations and plans of a 10-kVA 400-V single-phase regulator of both old and new types. The rating and output of the two designs are identical. A typical illustration of the sandwich type of regulator is shown in fig. 3 and of the new concentric type in fig. 4. Both illustrations show automatic operation.

THE SANDWICH AND NEW TYPES OF REGULATOR COMPARED.

	Sandwich Type.	New Type.
No load loss	100	45—75
Load loss	100	60—90
Total losses	100	60—85
No load current...	100	50
Internal impedance	100	25
Floor space	100	51
Weight, including tank and oil ...	100	57

It is apparent that the smaller and more compact construction shown in fig. 2b will result in better technical characteristics. A comparison of typical values is given in the above table.

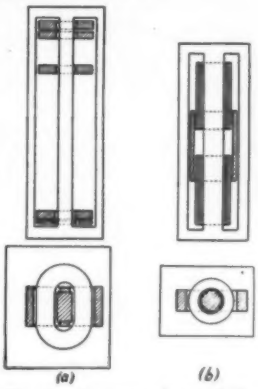


Fig. 2.—A comparison of the old and new types

The reduction in losses, whilst applying to all sizes, is most useful for the larger regulators in comparison with transformer on-load tap-changing gear. The low value of internal impedance now possible is mainly of importance for those regulators controlling mixed residential and industrial loads. The low power factors of motors, especially when accompanied by heavy overloads under starting conditions, greatly increase regulation difficulties. The reduced impedance, in the ratio four to one, possible in the new type is of great advantage in such cases. The small effect of load power factor on the regulator voltage is shown in fig. 6 for a normal design of 10 per cent. nominal boost.

The mechanical forces on the moving coil have always been small, but are even lower in the new design, which is such that the greatest forces occur when the moving coil is at the bottom of the leg and act in opposition to the weight of the coil due to gravity. In the new design the maximum force on the moving coil in the worst position at full load is only one-third of the weight of the coil itself. These negligible forces permit, where necessary, designs of very low impedance, as described in the preceding paragraph, which will yet withstand the worst short-circuit stresses.

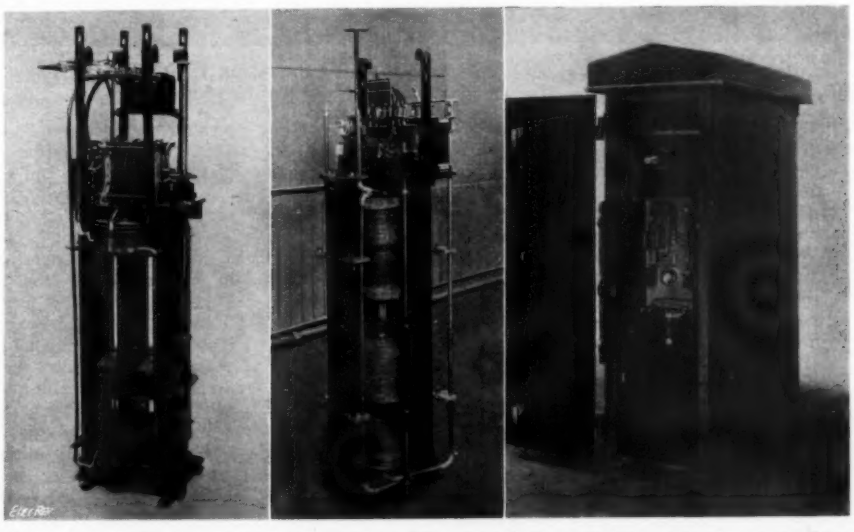


Fig. 3.—A 5-kVA fully automatic sandwich-type single-phase regulator. Fig. 4.—A new type 10-kVA single-phase regulator giving ±10 per cent. variation in an 11-kV circuit. Fig. 5.—A three-phase pillar-type construction

Of the physical characteristics the reduction in weight is most important for distribution regulators as it facilitates installation in rural areas and increases the range of sizes suitable for pole mounting. For urban underground distribution where space in sub-stations is restricted, the reduced floor area required by the new regulator will assist installation in existing buildings. The feeder pillar construction shown in fig. 5, already developed for the older regulator, is equally suitable for installation along a feeder or where no additional housing or protection is required. This particular example gives 15 per cent. boost and 5 per cent. buck in a 50-kVA 400-V circuit.

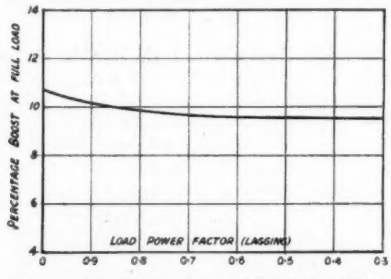


Fig. 6.—The effect of load p.f. on regulator voltage boost

The improvements just described are typical of recent developments in automatic voltage regulation which are greatly extending its field of application. The installation of regulators increases the capacity of mains and distributors, extends the range of sub-stations, and permits rapid adaptation of the system to unforeseen changes or developments in loading conditions.

The same modifications in construction apply also to regulators for industrial and laboratory purposes, such as the maintenance of constant temperature in electric furnaces, the regulation of rectifiers, and the control of high voltage in X-ray and testing apparatus. In most of these cases a greater range of voltage variation is required—even up to 100 per cent. The electrical connections are different, the junction between the coils *a* and *b* of fig. 1 forming one terminal of the output circuit, but the same change is made to concentric and circular coil arrangement, giving a corresponding improvement in the technical performance.

Special-purpose "Talkie" Equipment

An effective means of propaganda

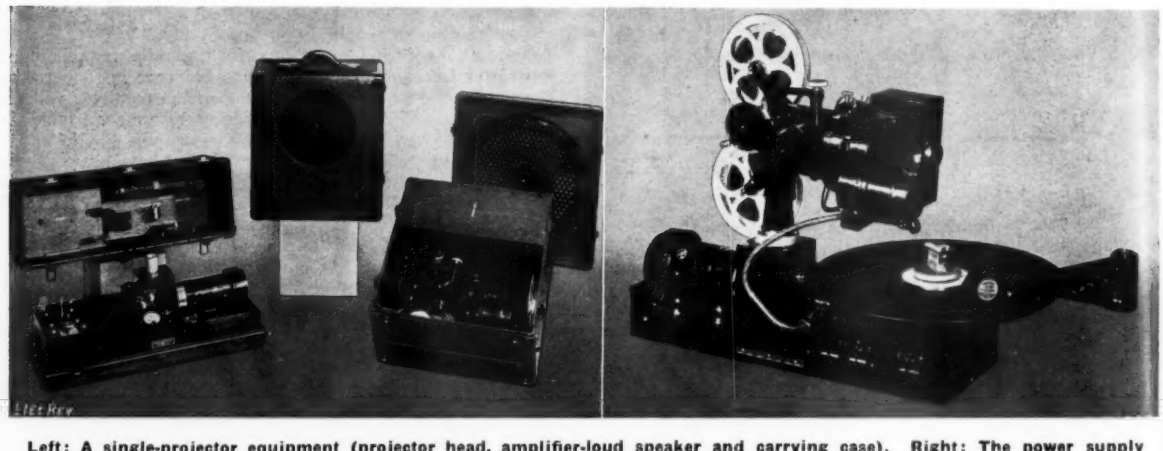
THE first pre-requisite of talking motion-picture equipment intended for commercial propaganda of an educative and demonstrative character is portability, since the restricted supply of suitable films of this nature does not justify permanent installations; and portability and adaptability must be combined with a high quality of performance.

These conditions seem to have been satisfied with a large measure of success by the Western Electric Co., Ltd., Bush House, Aldwych, W.C.2, whose experience of cinematography may be gauged from the fact that it has at least thirty-eight recording equipments in film studios in America and Europe, while in Great Britain alone it has installed reproducing equipment in over 1,700 theatres.

The company's newly designed commercial propaganda outfit reproduces motion pictures from 16 mm. film and sound from a gramophone disc running in synchronism. A picture up to 8 ft. 6 in. x 6 ft. 3 in. can be obtained, and the volume of sound is ample for an audience of six hundred. The disc system has been adopted in preference to photo-electric cells actuated by photographic sound records on the film because it is considered to be not only simpler and more reliable but also to reproduce the higher frequencies more faithfully.

Either single or double projector systems are available, the advantage of the latter being that a continuous performance can be given without any break whatever in the sequence of the films. The single system comprises a projector and an amplifier-speaker unit, and the double system two projectors, an amplifier-speaker unit, and a change-over switch. The maximum power consumption in either case is only 700 W. The projector is packed into two carrying cases, one of which carries the base and the other the projector head mechanism. In order to maintain perfect synchronism a single universal motor drives both the turntable and the projector head through a gear box, which enables the projector head to be driven at either sound or silent film speed and the turntable at 33⅓ r.p.m. (sound film) or 78 r.p.m. This motor is totally enclosed and its speed controlled within 1 per cent. by means of a centrifugal governor. It is suspended on rubber mounts to eliminate vibration, as also is the turntable, with which is incorporated a mechanical filter to smooth out speed irregularities. The pick-up employed is the company's standard oil-filled type and is detachable with its arm for packing.

The picture projector is of the claw type and will cover a range of projection angles of 25 deg. One unique feature is the automatic trip which stops the machine in the event of the film being laced up incorrectly, thus eliminating damage to films. The fan-cooled incandescent projector lamp (250 W, 20 V) enables a picture to be thrown 70 ft. The optical system is very efficient and incorporates facilities for adjusting the mirror and lamp for optimum results. The amplifier-speaker unit incorporates an all-mains amplifier, having two r.c. stages with a push-pull output. A full-wave rectifier supplies the plates of all valves and excites the moving-coil speaker.

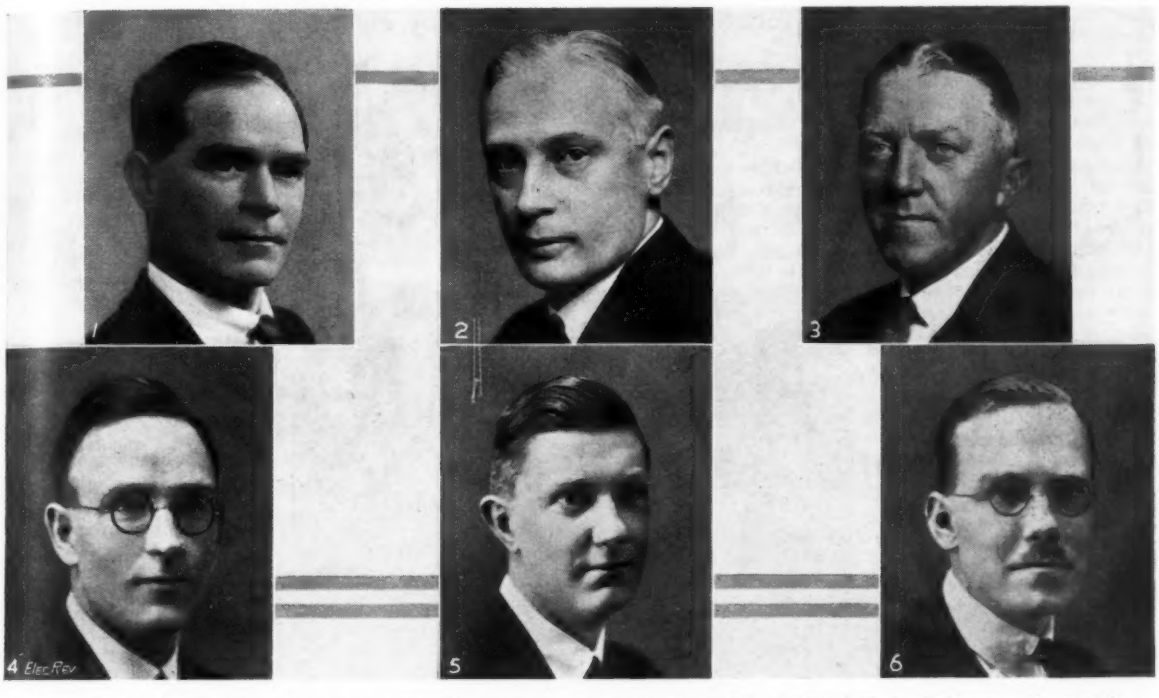


Left: A single-projector equipment (projector head, amplifier-loud speaker and carrying case). Right: The power supply side of the assembled projector

A variable-tap transformer is incorporated in the projector which enables the equipment to operate at between 175 and 250 V in the case of 40 to 60-cycle supplies. For d.c. supplies a double-wound convertor is plugged into a socket provided in the projector to feed the transformer only, not the motor. The only connections necessary are made by a cable running from the source of power to the projector and two cables from the projector to the amplifier speaker unit. With double projector systems a change-over switch interconnects the two projectors. All cables are of tough rubber and have non-interchangeable plugs.

Wide distribution of advertising films to specially selected audiences is the essential feature of any talking-picture sales campaign. To provide these distribution facilities the Western Electric company has established a " road show " organisation. The country is divided into sixteen areas, in each of which an agent maintains a stock of portable equipments, a staff of operators, transport facilities, and the necessary clerical and supervisory staff.

Some Driving Forces in the Industry: Alton Battery Co., Ltd.



1. Mr. W. R. Montgomery, director and general manager. 2. Mr. C. C. Rattey (*Elliott & Fry*), chairman and managing director. 3. Sir Alexander Roger (*Elliott & Fry*), director. 4. Mr. N. R. Oldaker, secretary. 5. Mr. C. V. Rowell, sales engineer. 6. Mr. H. W. Osborn, works superintendent.

Radio Apparatus and Change-overs. By R. H. Cobbold, A.M.I.E.E.

THE liability for dealing with radio apparatus when a change-over takes place is a matter on which there is considerable divergence of opinion. Having been occupied with change-over work for over three years, I have had to give it much thought from the point of view of the consumer as well as that of the supply authority, and the following conclusions may be of assistance to those who have yet to face the problem.

In the early days of wireless d.c. all-mains receivers were scarce and were often justly frowned upon as being unsafe. H.t. eliminators in general did not (and still do not) turn d.c. meters and were also often considered dangerous. Further, such apparatus was expensive when compared with present prices and was regarded as being in the nature of an experiment or a personal hobby without intrinsic merit. These facts led supply authorities to disregard such apparatus and to discount its possibilities; many people would barely admit that it was electrical apparatus in the then generally understood meaning of the words. The day of domestic electrification had hardly dawned and the possibilities of wireless as an entrée had not been realised.

From this state of affairs and attitude of mind the idea that a supply authority has no liability for radio apparatus has arisen; it has gained ground because certain towns have changed over without dealing with the matter and has been fostered by the desire to avoid the high cost of doing so.

The decrease in the cost of radio apparatus, and particularly all-mains sets, has, *inter alia*, led to a very big increase in the use of the latter; the writer believes it to be as high as 500 per cent. in the last few years with the saturation point still far distant The consumption of an all-mains set is from 30 to 60 W (rising to over 100 W for certain d.c. receivers), and when allowance is made for the increased use of light which it causes, it can safely be said that the contribution to units sold is not negligible. Eliminators on a.c. turn the meter, and do a part in swelling the revenue. Both offer a strong incentive—not sufficiently recognised—in favour of the introduction of electricity into a house for lighting and heating.

Altered Circumstances

These facts have a marked effect upon the position; the old arguments become untenable and the greater weight of public opinion commands more generous consideration. However, the cost is still high; averages taken in 400 cases show 25s. for each h.t. eliminator, 70s. for each all-mains set, and about 140s. for radio-gramophones. There is, therefore, still a natural tendency on the part of supply authorities to try to justify avoiding this heavy expenditure.

The terms of the Commissioners' consent to a change-over do not draw any distinction between classes of apparatus and offer no justification for eliminating radio apparatus from the liability imposed upon supply authorities by the terms of consent; nor does the consent offer any grounds for refuting liability because the connection of the apparatus has not been notified. If this attitude is adopted it should in equity be applied to all classes of apparatus which would soon render the position quite untenable. To the best of my knowledge there has not, somewhat surprisingly, been a legal action about domestic radio apparatus; it seems probable, however, by inference from cases concerned with other apparatus, that a court would rule that provision must be made for it.

From the consumer's point of view it is undoubtedly a hardship that he should be deprived of the use of radio apparatus because of a change-over, and he will justly argue that it is unfair that he should be put to expense for the sake of an alteration for which he did not ask and which is for the ultimate good of *all* consumers, even if it is not for the good of the supply authority only, as he will probably imagine. He will argue that if his vacuum cleaner or electric fan is dealt with similar treatment should apply to his radio apparatus, which, if of the all-mains type, will usually have the same consumption, and logic and fairness are on his side.

There is, therefore, little ground either legally or morally for refuting liability for wireless apparatus, and the effect of so doing on the relations between supply authority and consumers must be taken into account. Whilst little increase of goodwill is likely to be achieved by dealing with radio apparatus, not to do so will undoubtedly detract very greatly therefrom with unfortunate results on sales of fittings, apparatus and wiring. A change-over offers an extremely valuable opportunity for acquiring or strengthening a reputation for courtesy, fair dealing and good workmanship, which will stand a supply authority in very good stead; by dealing with radio apparatus contact is made with a large number of consumers.

The provision of external rectifying units for eliminators and all-mains sets forms a satisfactory basis for conversion and appears to have a measure of official approval. Certainly such a method is fair and reasonable, and I would suggest that the additional cost of any alternative method which a consumer may require (such as internal reconstruction, which may cost between 80s. and 140s., according to the type of set) should be borne by him. This arrangement, I know, gives satisfactory results in practice, and commends itself to a consumer because he will by this means have his set overhauled and, if necessary, a new set of valves fitted. He will usually receive good value for his expenditure and will be more satisfied than if he has a rectifier with its attendant losses and, if of the valve type, maintenance cost.

A Sand-pit and Brickfield

Many forms of power displaced by electricity

THE introduction by the County of London Electric Supply Co., Ltd., of a public supply into the locality has resulted in electricity being used at the sand-pit and brickfield of the South Merstham Sand and Brick Co., Surrey, to displace petrol, oil, paraffin, semi-Diesel, gas, and even actual horse power. On a pontoon on the water-laden sand-pit a 60-h.p. motor drives a Gwynne centrifugal pump, and a 12-h.p. motor drives through belt and gearing a cutter which revolves around the mouthpiece of the 38-ft. suction arm, cutting at the working face and keeping the sand in suspension in the water for pumping. The pump and the cutter were originally driven by oil and paraffin engines of a power corresponding to the motors now driving the equipment.

Ashore there is a duplicate pumping set connected in series in the pipe line for boosting. The flexible pipe-line is carried on barrel-floated rafts. The sand and water mixture is delivered to overhead screens for the removal of foreign matter, and discharged into bins in which the sand settles and the water is run off back into the lake. The high-quality silica sand is then ready for delivery. To maintain the water at a sufficiently low level there is a 12-h.p. motor belt driving a Gwynne centrifugal pump which was originally driven by a semi-Diesel engine. This pump usually runs for five or six hours every day. Above the water line sand is removed by ordinary digging and is raised to the ground level in "skips" on a 2-ft. gauge track up an incline of about one in ten by a 12-h.p. motor-driven winch which hauls two 1-cu. yd. skips at a time. This winch was previously driven by an 18-h.p. petrol camel engine on a caterpillar tractor.

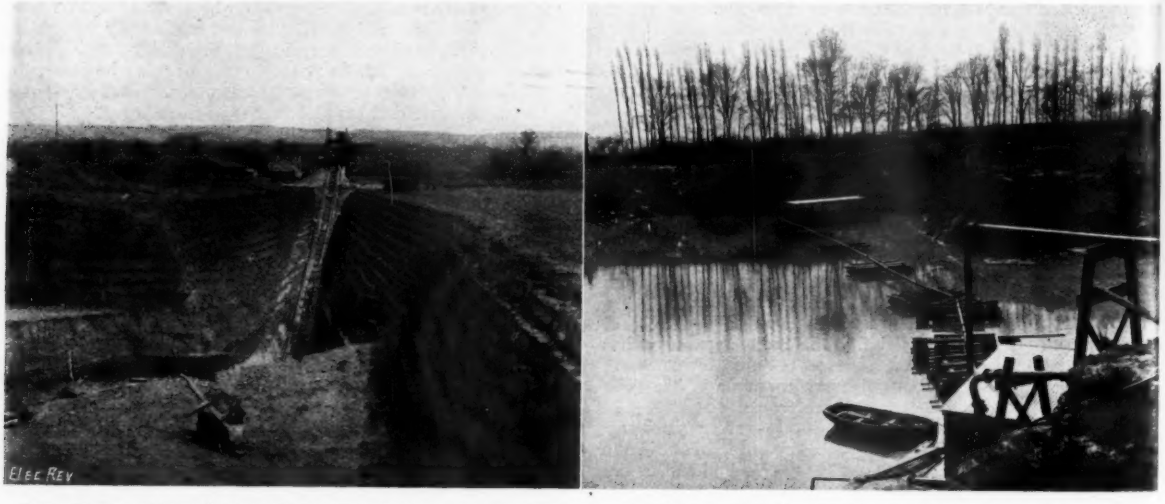
A 60-h.p. motor driving the pump and a 12-h.p. motor driving the cutter, inside the pontoon

Above the sand strata there are several feet of brick earth subsoil. This is dug out during the winter and prepared and weathered ready for brick making in the summer, when it is watered and partially mixed and delivered to pug mills in which it is mixed and ground and delivered as a plastic material ready for the brick moulders. Water for mixing is provided by the lake dewatering pump. One pug mill which was at first driven by a gas engine is now served by a 12-h.p. motor, and it will turn out sufficient material for the production of 1,000 brick mouldings per hour. Another mill which is now driven by a 7-h.p. motor was at first a one-horse (actual) mill with the same output.

Mr. D. R. Ray, to whom we are indebted for the information given in this article, asked us for an explanation of this apparent anomaly. We leave our readers to provide an answer. The moulded bricks are set out in the open for drying, and after a definite period are either set into clamps and burnt for the production of multi-stock facing bricks, or placed in down-draught kilns for the production of red facing bricks. About 30,000 bricks are treated in a kiln at one time, and are responsible for the consumption of about eight tons of coal. The temperature in the kiln is about 1,000 deg. C., and these two figures indicate the commercial and technical requirements for the successful heating of brick kilns electrically. After burning or heating the bricks are discharged from the clamps or kilns and sorted and stacked according to colour ready for delivery to the buyers.

From a step-down transformer station on site electricity at 400 V, three phase, is delivered to the works switch house from which c.t.s. cables suspended from catenary wires on poles are run to the land power points. Feeding the pontoon motors there is at the switch house end a l.c. underground cable which connects with a heavy c.t.s trailing cable in an underground connecting box. The trailing cable is supported by the pipe-line rafts, but not secured to them. Both its ends are permanently connected, there being plenty of play to allow for varying the position of the pontoon on the lake.

All the motors are three-phase slip-ring machines produced by Brook Motors, Ltd., and, with the exception of the large pontoon pumping motor and the duplicate boosting motor ashore, they are all controlled by Brook face-plate type starters. The two exceptions are controlled by Ellison drum-type rotor starters.



Left: The sand-haulage incline through brick earth, served by a motor-driven winch. Right: A pontoon housing a large motor-driven pump and sand cutter, showing the raft-supported pipe-line and trailing cable

The B.E.A. Handbook

The British Engineers' Association's annual handbook of members and their manufactures has just been issued. Within the next few weeks 5,000 copies of this publication will have been posted to buyers of engineering products in the home and overseas markets. The handbook has 300 pages, of which 88 are occupied by a classified list of manufactures of members of the Association, which forms a useful buyers' guide to diversity of goods. Copies can be obtained gratis from the Secretary, 32, Victoria Street, S.W.

Electricity Supply in Jersey

NINE years ago the Jersey Electricity Co., Ltd., commenced to supply energy for all purposes under a concession granted to it by the parish authorities of St. Helier. During the year 1932-33, 2,572 consumers purchased 1,707,168 kWh. For some years the company's policy has been to limit the dividend paid to 10 per cent., the surplus being utilised to lower prices and improve the service offered to consumers. A well-stocked showroom is maintained and the turnover of the Sales and Contracts Department is growing rapidly.

With an annual increase of over a quarter of a million kWh in the energy sold, under the guidance of Mr. F. M. Burrell, engineer and manager, and his enthusiastic staff, headed by Mr. H. H. Longson, assistant engineer, the output of the undertaking is now well over three times what it was five years ago.

The New Station

A new generating station equipped with oil engines was officially inaugurated on May 29th, and a Bill is being prepared for presentation to the States to authorise the company to supply electricity throughout the island.

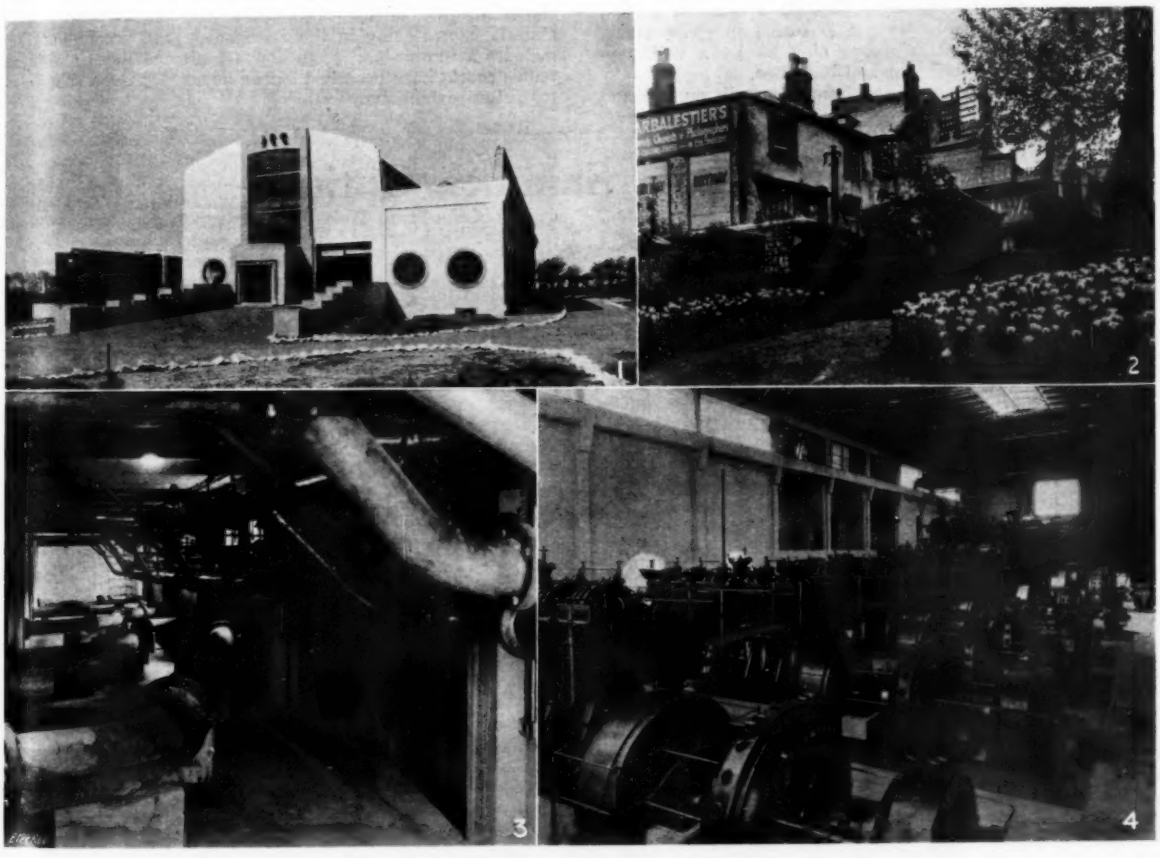
The four-acre site of the new station is 1.5 miles from the centre of the town, 240 ft. above sea-level, and the building reveals Mr. R. C. Blampied's refreshingly unconventional architecture. The reinforced concrete framework is filled in with concrete block panels which, with a movable temporary end, will facilitate extensions, while the roof is of "Lamella" pressed-steel construction by the Horseley Bridge and Engineering Co., Ltd., with a two-ply "Ruberoid" covering.

Fuel oil is delivered by sea and pumped from the ship into storage tanks in the old generating station (now a sub-station and stores) alongside the harbour. Thence it is transported by road to the new station, the lorry tanks being removable so that the vehicles can be used for other purposes. At the power station the oil is delivered by a motor-driven pump, with a stand-by hand pump, from the lorries into four 500-gallon interconnected tanks, whence it is conveyed to the engines by common bus-pipes through "Auto-Klean" strainers and "Arcon" fuel meters. The "ready for use" oil tanks are in fire-resisting compartments in an annexe to the main building. The louvre ventilators of these compartments are fitted with hinged covers which are held open by lead fuse wire, so that in the event of a fire the fuse wire will melt and allow the covers to fall, so cutting off the supply of air to the compartments.

Oil-engine Plant

The engine-room floor is well above the ground level, the isolated foundation blocks being half above and half below ground level, resting on solid rock 10 ft. below the overlying shale and rubble. The plant consists of four 160-kW and one 336-kW trunk-type five-cylinder Mirrlees Diesel engines, each coupled direct to a Crompton alternator. These sets, which were transferred from the old power station, generate three-phase 50-cycle current at 415 V, stepped up as required by transformers and coupled through low- and high-voltage isolators to the main high-voltage switchboard. The two newer sets are five-cylinder crosshead-type Mirrlees oil engines, each coupled direct to a 570-kW Crompton-Parkinson alternator generating three-phase 50-cycle current at 6,600 V.

The generators and feeders are controlled by Crompton truck-type switchgear on both the low- and high-voltage sides, and at present three outgoing feeders connect the new station with a Ferguson Pailin main distribution board at the old Albert Pier station, which controls the outgoing high-voltage net-



The Jersey Electric Company's New Station

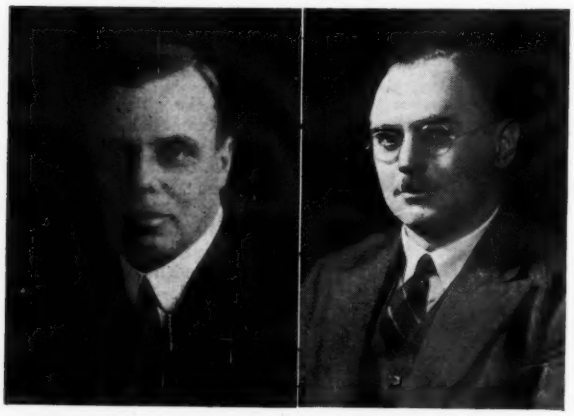
1. Showing the unorthodox design of the building. 2. A typical outdoor sub-station. 3. The ground-level pipe passages. 4. The generating plant

work. Since this distributing centre coincides approximately with the centre of the load, which fringes the south and south-east coasts of the island, no long transmission mains are needed, and 6.6 kV is a sufficiently high voltage for immediate needs. Each step-down transformer station consists of three metal-clad units placed out of doors and painted green to tone with the shrubs and flower beds which surround them.

Three-phase 50-cycle a.c. is distributed at 415/240 V on the four-wire system, mostly by paper-insulated lead-covered and served underground cables, but short lengths of wood-pole overhead lines have been erected on the outskirts. A glass bulb "Hewittic" mercury-vapour rectifier installation furnishes d.c. for the docks.

In addition to the above-mentioned plant, foundation work has been commenced for the accommodation of a 960-kW Fraser & Chalmers-G.E.C. set in the new station, while two high-speed Ricardo auxiliary sets of 175 and 200 kW respectively have been retained in the old station for stand-by purposes.

Lubricating oil is returned to a settling tank in the basement, from which it is pumped to a gravity feed tank in the top cooler room. After passing through a common system of three "Streamline" filters it is stored in clean tanks, whence it is conducted by means of a bus-main with tappings to the engine lubricators and bedplates.



Mr. F. M. Burrell, engineer and manager of the Jersey Electricity Co., and Mr. H. H. Longson, his assistant

A supply of water is obtained from two wells on site and also rain-water catchment. The cold water feed system is in duplicate and so arranged that all engines can be supplied from the normal shower cooler or from the mechanical coolers, the principal object of which is to furnish after-cooled water for the air compressors and oil coolers.

The pipes are all accommodated in generously dimensioned passages between the foundation blocks on ground level, below the engine room floor. They are thus very accessible. The hand-operated "Morris" crane has a 50-ft. span and an electrically driven 10-ton hoist.

The engines exhaust into primary cast-iron silencers and thence into reinforced brick-concrete pits arranged half above and half below ground. The air suction for the larger engines is taken from the basement, thereby reducing noise and ensuring good ventilation. A "Hamworthy" high-pressure compressor has been installed in the basement of sufficient capacity to assist any of the engine compressors.

Adjacent to the main switchgear is a desk-type board with removable back panels and hinged front doors which controls the station lighting and all auxiliary equipment, which has duplicate supply mains. All fuses are grouped at this point and the board is fed both from a local step-down transformer and from the outside low-voltage mains. Auxiliary stand-by lighting is assured by a "Tudor" 100-V trickle-charged battery and "Safetylyte" switch-over gear.

In a corner of the engine room there is a workshop, while above are the engine spares and tool stores, the heavy material stores being in the basement. Staff accommodation includes a shower-bath room and a sports pavilion, and hard tennis courts have been laid out on adjacent ground scheduled for future extensions.

The O.L.A. Summer Outing

ASSEMBLING overnight at Droitwich and Birmingham, members and friends of the Overhead Lines Association set out on Saturday morning last to tour part of the service area, which comprises 4,500 sq. miles, of the Shropshire, Worcestershire and Staffordshire Electric Power Co.

The company operates in ten counties within the south-west, central, and north-west grid areas, including practically the whole of Worcestershire and considerable portions of Staffordshire, Shropshire, Gloucestershire, Warwickshire, Herefordshire, Oxfordshire, Brecknock, Radnor, and the South Wales coalfields in Monmouthshire and Glamorgan.

Two large power houses at Stourport (80,000 kW) and Upper Boat (75,750 kW) at Treforest, South Wales, are the main sources of supply into the network of 1,900 miles of transmission and distribution mains. They operate in conjunction with the company's original station at Smethwick and smaller plant at Hereford and Redditch, the total capacity of the generating plant at present being approximately 300,000 h.p.

The standard system of supply is available throughout the combined areas. Overhead mains are operated at 66, 33, 11, and 3.3 kV, and underground cables at 33, 11, and 5.5 kV, while local distribution by means of both overhead lines and underground cables according to the requirements of rural and urban localities is from step-down transformer sub-stations at 400 V, three-phase, and 230 V, single-phase. Portions of the old 25-cycle system are being converted to the standard 50 cycles, while d.c. is still available at 460/230 V in parts of Dudley and at 500/250 V in parts of Smethwick

The mains network of the combined undertakings is interconnected with neighbouring authorities and supplies in bulk are given to subsidiaries and the Cheltenham Corporation, while reciprocal supply agreements have been made with the South Wales, West Gloucestershire, and Wessex Companies, the Birmingham and Worcester Corporations, and the West Midlands Joint Electricity Authority.

Edmundson's Electricity Corporation, Ltd., has a controlling interest in the S.W. & S. Co., which has itself acquired the control of the South Wales, Kidderminster, Stratford-on-Avon, Ledbury, Banbury, and Tewkesbury undertakings. It also owns the S.W. & S. Development Co. and maintains an estate department, which affords assistance for industrial enterprises of all classes seeking suitable sites. The geographical situation of the area offers many exceptional features of rail and water transport, skilled male and female labour, and raw materials which have led to the establishment of many industries.

The first halt in the tour was at the generating station adjacent to the grid switching station at Stourport, which is actually a port, being situated at the junction of the extensive Midland Canal system with the River Severn, which is navigable for ships up to 100 tons. Of the eight "Stirling" boilers installed, four are of 60,000 lb. per hour, each complete with B. & W. horizontal steel tube economiser superimposed, and the other four are of 90,000 lb. per hour capacity with economisers and air heaters. There are two 15,000-kW, one 20,000-kW, and one 30,000-kW main turbo-alternators and one 750-kW d.c. turbine-driven house set, all of the B.T.-H. Co.'s manufacture. The station also contains one 1,150- and one 5,000-kW 50/25-cycle frequency changers and two rotary convertors of 750 and 1,000 kW.

Members of the O.L.A. and friends outside the Stourport station

Continuing the drive through lovely Worcestershire the second halt was made at British Camp, a one-time hill fortress from the top of which thirteen counties are visible on a clear day, for luncheon as the guests of the S.W. & S. Co. Mr. L. Howells, general manager, who presided over a gathering numbering ninety-five, welcomed the visitors on behalf of the company and expressed the hope that the Association would continue to flourish in its new form as a section of the I.E.E. Major T. Rich, president O.L.A., returned thanks.

Here the party divided, the smaller section driving direct to the Worcester golf links, where play took place for a silver cup presented by Mr. J. H. C. Brooking, and tea was provided by Mr. J. L. Eve, vice-president and organiser of the summer meeting. Meanwhile the main contingent continued on its motor-coach tour.

Electric Cooking Technique. By Penelope Warrender

Making the most efficient use of the oven and hotplates

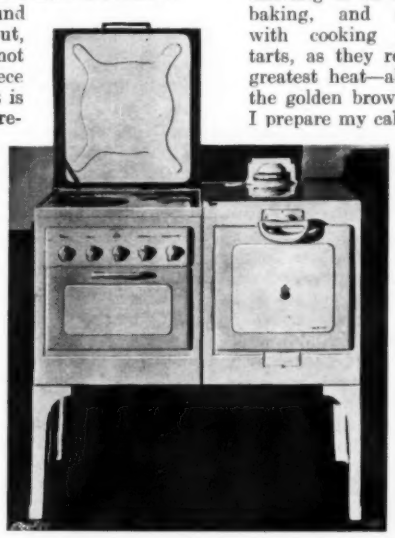
FOR many years both manufacturers and supply engineers have considered the cooker industry from numerous angles, and uppermost in their minds has been the question of the preheating of the ovens. The time taken by many ovens was far too long and often compared unfavourably with the gas cooker, but there are now several modern ones available which are fitted with extra elements, making it possible for 400 deg. F. to be reached in about fifteen minutes.

If the utmost service is to be gained from a cooker it must be available for use within a few minutes, both as to the oven and hotplates, as it may be required merely to warm up some pies or tarts quickly. The increase in the numbers of persons who have installed electric cookers is due to a realisation of its superior hygienic qualities, even heating (there are no "cold" or "hot" spots), improved quality of the food, elimination of waste (as there is very little shrinkage due to evaporation), and the absence of flames, soot, or fumes, the heat being concentrated just where it is required and easily controlled and measured.

I think one of the main points in favour of an electric cooker is that it may be placed *anywhere* in a good light and yet within easy reach of the larder. I hope the time is not far distant when it will be available in most pastel shades to be in keeping with any decorative scheme in the kitchen. The switches should always be of a darker tone than the main body, so that the labels are easily readable from a distance.

The height of the oven from the ground has been discussed time and again, but, for myself, I prefer one which does not involve too much bending. A one-piece removable oven interior is a boon, as it is so easy to clean. Cooking should be regarded as one of the pleasantest household occupations, yet if much labour is involved in keeping the cooker clean, the housewife will not be tempted to prepare more food than the absolute minimum.

The griller on some models is totally inadequate, and I hope that more consideration will be given to this point in the near future. There is a novel cooker on the market in which the manufacturers have placed a grill of ample dimensions inside the top of the oven, thus ensuring a larger grilling area. This device is also used for the pre-heating of the oven; when the required temperature is reached the grill is switched off, and an insulated deflector pan spreads the heat obtained from the bottom element over the entire oven evenly. It is also fitted with a thermostatic control which is a very necessary equipment in every busy household, saving much time and trouble.



A Moffat cooker with "Therm-o-Matic" control (hinged top open)

Another cooker provides for the preheating of the oven by incorporating wells, in the top and bottom, which take the elements, thus allowing greater cooking space. The wells also act as reflectors and ensure an even temperature. I prefer one of the hot-plates to be of the semi-radiant type, with easily replaceable spirals, and the other of the solid-type, which is better for simmering.

A "close-up" showing the oven control, balanced drop door, concealed switch mechanism, and large warming drawer under the oven

When deciding on either the hiring or purchasing of a cooker, the consumer would do well to consider: (1) how many hours are spent in the kitchen—are they out of all proportion to those spent in other parts of the home? (2) How much food can be cooked per cu. ft. of oven space. (3) Accessibility for examination and replacement of the elements. (4) Ease with which the oven and top can be kept clean. (5) Even distribution of heat for general cooking operations.

As a practical guide to those contemplating changing from other methods of cooking to electrical, I will quote my actual experience with a modern cooker. Before switching on, I arrange the shelves in the oven in the position most convenient for the dishes which I contemplate making, to avoid losing heat afterwards. My oven takes about twenty minutes to register 400 deg. F., and I always cook as much as possible at one baking, as this not only saves current but also allows me more leisure.

Miss Warrender is a consultant for interior decorations, specialising in modern lighting and all-electric heating

No heat is lost through my having to open the oven door to turn cakes or joints round, as it is so evenly distributed.

I allow for one full morning to be devoted to baking, and commence with cooking pies and tarts, as they require the greatest heat—about 450 deg. F. While these are attaining the golden brown colour essential to "good-looking" pastry, I prepare my cakes and put them in as soon as the first batch is done. Finally, the joint is cooked, as the temperature has now fallen to 400 deg. F.; when this is taken out, there is usually enough heat left to cook either a milk pudding or warm a bowl of water.

For cooking meat or poultry I leave the oven at 400 deg. F. for ten minutes, then switch to low for the remainder of the time required. Puff pastry requires the oven to be at 475 deg. F. and left with the switch at "full" for five minutes, then turned off completely; short pastry requires the oven to be at only 425 deg. F. and then left in the "low" position for fifteen or twenty minutes. For small cakes I allow a temperature of 400 deg. F., and after ten minutes turn the heat off, but large fruit cakes necessitate the switch being at "low" for the required baking time—usually one hour to the pound.

Electricity is *Not* Expensive

I have often been asked if I do not find cooking by electrical means expensive, and to this question I can unhesitatingly reply: "Personally, I find it most economical both as regards consumption and also wear and tear of utensils, but it *can* be expensive, just as gas or coal cooking is, if the cook is of extravagant habits." The boiling-plates, too, are often ill-used; there is an old idea that vegetables need plenty of water to cook them properly and that the lids of the pans must be off. This is incorrect; a quarter of a pint of water for every pound of vegetables is ample and allows the steam which has condensed on the lid to fall back into the pan, making the food, through the conservation of its vitamins and natural salts, more nourishing and tasty.

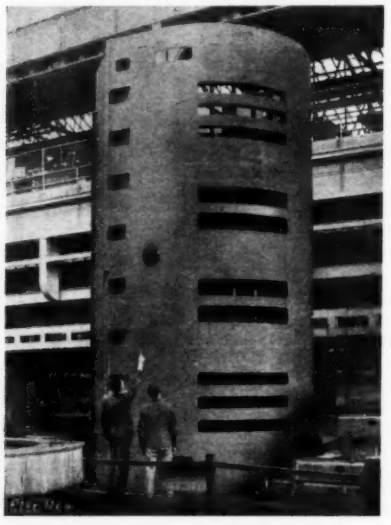
Our family consists of five persons, who all partake of a hot cooked breakfast. A light lunch is cooked daily for two persons only, except at the week-end, when the remainder are at home. Dinner for all (usually three courses) is served on seven days, and coffee is made with the aid of an electric percolator every evening, yet the cost of electricity at 3d. per kWh works out at an average of only 3s. for the week. We have occasional visitors for the week-end or for longer periods, but do not find that this appreciably increases the consumption of energy.

I think that this is sufficient to show that electricity can compare very well with other means of cooking, and if everyone connected with the electrical industry, even in a very slight way, used electricity more freely it would induce others to do likewise, and cheaper hiring facilities would result. There is no better slogan for advertising electricity than "Clean, cool and convenient—always."

The Liverpool Convention

LAST week we gave a full report of the I.M.E.A. Convention up to, but not including, the annual dinner, which was held on the Wednesday evening at the Adelphi Hotel, Liverpool. This dinner, the best attended of any of the thirty-nine that have been held by the Association (upwards of 600 being present), was the first at which royalty has been present, and we thought the speeches well above the average. On this occasion they were none the less acceptable for containing little of specific electrical importance.

The president (Mr. P. J. Robinson) at the opening read a telegram from the King and Queen conveying thanks for the message sent them on the opening day. The Duke of York, responding to the loyal toasts and proposing that of "The Association," referred to the scientific research and enterprise which, since the formation of the I.M.E.A. in 1895, had made electricity so useful a servant. He had been much impressed by Clarence Dock power station and regarded the provision of a cheap and abundant supply of electricity as essential to recovery from trade depression. His interest in welfare work caused him to look forward to electricity's taking its full share in the well-being of those living in poorer homes.



A large fabricated stator at the Met.-Vick. works

He also acknowledged the efforts of electrical engineers to add to the safety of the streets by new methods of lighting. All these developments were of national importance and he would watch with interest the development of the national electrical scheme through the endeavours of the Association.

The President, in his response, made a special reference to Mr. W. A. Lackie, who was making what may be his last public appearance as an Electricity Commissioner

Sir Andrew Duncan proposed "The City of Liverpool," to which the Lord Mayor (Mr. G. A. Strong) and Lord Derby responded. Sir John Brooke, replying to the toast of "Our Guests and Ladies," proposed by Mr. E. E. Hoadley (vice-president), confirmed the appreciatory references to Mr. Lackie's work. He urged the need for an adequate number of posts in municipal service which by their responsibility and adequacy of reward would attract men of the highest technical attainments.

"The Liverpool Electric Power and Lighting Committee" was proposed by Ald. W. H. Thickett, who said that in 1920 Liverpool sold 86¼ million kWh at an average price of 2.41d., but for the year ended March 31st, 1934, the figure was 340 millions at 1.12d. In his response Ald. F. C. Wilson (chairman of the Committee), attributed the progress made in Liverpool to the policy of accepting the valuable advice of Mr. Robinson.

A pleasing and, to most of those present, an unexpected touch was given to the concluding stages by the Duke of York, who proposed the health of the President. Mr. Robinson, in briefly thanking the Duke, attributed the success of his undertaking to the team work support of his staff.

A.c. Distribution Systems

Thursday morning's business was the reading of Mr. L. Romero's paper on "Modern Practice in the Layout of A.C. Distribution Systems," which was reported in our last issue. Opening the discussion, Mr. H. W. Clothier (Reyrolle & Co.) said that a few of the I.M.E.A. members had recently made use of the Hebburn testing plant. There had been little agreement hitherto regarding the interpretation of kVA rupturing capacity. Was the controlling factor the severity of the conditions? Did the term include all other circumstances, such as "making" capacity? This was related to breaking capacity, but the current was higher upon the short-circuit transient.

Mr. A. W. Clegg (Accrington) reported that he had one spare transformer for every five sub-stations. Mr. J. G. Statter (Statter & Co.) gave particulars to illustrate his contention that circuit-breakers were being substituted for fuses by many undertakings. They were speedier and could be used with induction relays to secure selective operation. Mr. W. P. Lilwall (Fleetwood) expressed the view that interconnection of sub-stations through the l.v. mains would become more common, but Mr. C. Turnbull (Tynemouth) believed that mains interconnection through fuses which might be suitable for small undertakings would give trouble when sub-stations exceeded 1,000 kW and had 1-in. cables running from them.

The President stated that he bought land for sub-stations at quarter-mile intervals in advance of town-planning schemes, thus saving money. In Liverpool 15,000 of the new houses were supplied from mains run under the eaves at a cost per house of less than £5, including h.v. cable and transformer station; for 14,000 houses fed underground the cost was £18.

The author, in his reply, urged that a national proving house was required for testing circuit-breakers. He did not agree that the number of fuses had decreased during recent years.

A Visit to Trafford Park

Shortly after noon nearly 600 delegates visited the Met.-Vick. Trafford Park works—the largest party that has ever been there. After being entertained at lunch by Sir Felix Pole and other directors, the visitors inspected some of the more important plant now going through the works at the present time. The most striking was the 105,000-kW, three-cylinder, 1,500-r.p.m. turbo-alternator for the Battersea station of the London Power Co., which is the largest set to be installed in Europe, and 40 per cent. larger than any yet built in Britain. Other exhibits included the two 60,000-kW turbo-alternators for Fulham, a 24,000-kW turbine for steam conditions of 1,763 lb. per sq. in. and 878 deg. F., and various examples of large fabricated structures.

In the evening 800 municipal representatives and their ladies had the unusual and most enjoyable experience of dancing on a liner, the m.v. *Georgic*, in Gladstone Dock as the guests of the Lord Mayor and Corporation of Liverpool.

At the annual general meeting, which was held on Friday morning, Mr. E. E. Hoadley (Maidstone), a sketch of whose professional career was included in our last issue, was elected president for 1934-35, and Mr. E. Seddon (Edinburgh), vice-president. The honorary officers were re-elected and the following representatives agreed to serve on the Council: For large undertakings: Messrs. E. A. Barker (Barnsley), L. Romero (Salford) and C. W. Salt (Carlisle); for small undertakings: Mr. W. J. Bache (Cheltenham); and for local authorities: Ald. W. Walker (Manchester) and Ald. F. C. Wilson (Liverpool). The decision as to next year's meeting-place was left in the hands of the Council.

This photograph, taken on Thursday last week, shows some of the six hundred I.M.E.A. delegates who visited the Met.-Vick works, Trafford Park, at luncheon in one of the staff canteens

The last item on the agenda of a most enjoyable as well as educational Convention, was a circular tour through North Wales, upon which 330 members were conveyed in coaches.

The Paris Fair

Our Paris Correspondent reviews the electrical exhibits

THE Paris Fair for 1934 has been an unqualified success. In spite of political uncertainty and economic depression, the Fair was larger than ever, there being about 500 exhibitors in the electrical sections. The radio section was particularly large. This year great attention was paid to the medium and lower priced receivers, reductions having been made in most cases. The noticeable changes consisted mostly of anti-interference devices, both for radio receivers and motors.

A large number of radio concerns exhibited in the Hall of Music, and there was a wide selection of radio-cinema sets

The "Solor" arc soldering iron

designed for use in the home. Most of the sets were portable and would take any sound film of 16 mm. The prices of these machines are still rather high, however.

The majority of radio sets embodied special improvements, such as special connections for use in motor cars. Nearly all had single control. Philips had a new octode valve embodying an oscillator and modulator-amplifier; it is intended to do away with the usual inconveniences of heterodyne circuits. Amplification, which is obtained by conversion, is about 225 times.

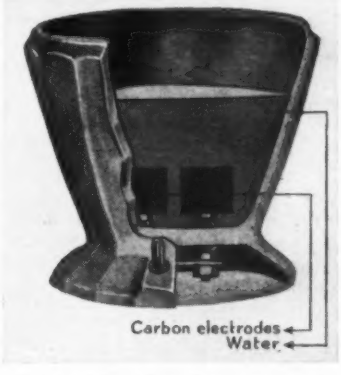
Loewe Radio exhibited a double-reading cathode-ray tube, and an improved single-reading tube. The new tubes are built to remedy the limitations of the old Braun tubes. The principal change in the single-reading tubes is the suppression of the Wehnelt cylinder and its replacement by electro-optical control. The double-reading type has a double set of electrodes in the same tube. The plates of the time deviation condenser are common to the two systems, while the other deviation condensers are separate for each set of electrodes.

This has important advantages when the tubes are used in an oscillograph for television, as well as for electrical observation. If the ingoing voltage of the apparatus to be examined is applied to one set of plates while the outgoing voltage is applied to the other set, the variation in the value of both can be seen simultaneously on the screen, and phase displacement, or the way in which the amplitude of the oscillations has been damped, can be seen immediately. In the older method it was necessary to photograph the variations of each value separately, and then measure and compare them. In television the double-reading tube permits a simplification of the double channel method, and the makers suggest that it will eventually permit television in colour. The life of the tubes has been increased, it is claimed, to more than one thousand hours.

Domestic Appliances

In the domestic field a floor waxer which has revolving brushes in an iron frame was shown on the Mars stand. The motor is of the universal type and drives the brushes by friction. There is an automatic liquid wax distributor on the handle. Makers of motors are beginning to concentrate on special types which, until recently, were generally imported. Small sizes for domestic apparatus are also being developed.

The "Valair Aquatherm" is a new type of water heater which can also be used as a double boiler for heating milk, coffee or other liquids. It is made in various models for heating baby's bottle, the bottle forming the inner vessel of the double boiler, for humidifying the air in a room, and in a multiplex model for miscellaneous heating uses. It is in white or coloured porcelain. The heating is based on the electrical resistance of water. In the bottom of the vessel are two special carbon electrodes. When water is put into the vessel and the current switched on, the resistance of the water causes it to heat. There is no danger in leaving the current on, as when the water has been evaporated the current is automatically cut off. The apparatus works only on alternating current.

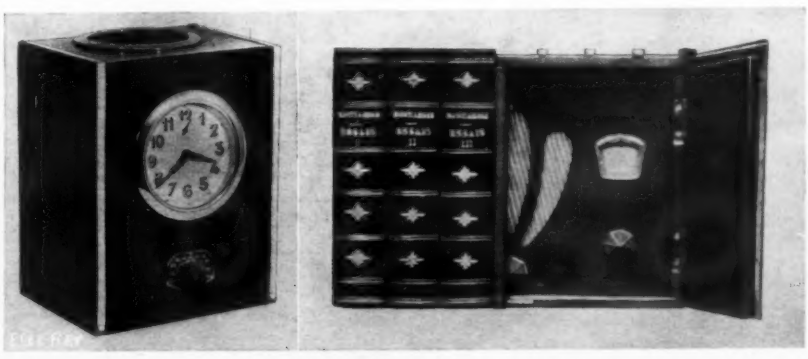


The "Valair Aquatherm" water heater

There were one or two interesting electrical clocks, including the "Cotna," an electrically wound alarm clock in the base of a lamp. At a predetermined time the clock rings and the lamp is turned on. In case of a breakdown on the system the clock always has six or seven hours' reserve movement in the spring. Brandt & Fils had a series of metal boxes for enclosing the different apparatus on a switchboard, and were showing a whole switchboard with the different equipment enclosed in their boxes.

An Arc Soldering Device

It appears that in the electrical soldering and welding section little development has been made in automatic machines as French manufacturers do not find them satisfactory. Hand-soldering machines, on the other hand, show a number of novelties.



Two radio sets: Left, with an electric clock for automatic switching; right, a dummy bookcase

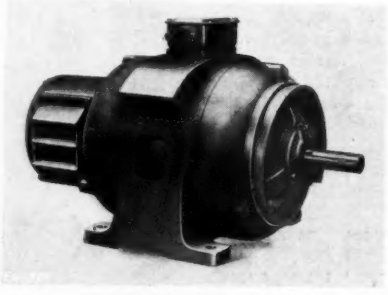
The "Solor" arc soldering iron, which was on view, for example, permits the finest work to be done perfectly with a lower consumption than is usually required. The temperature can be regulated by varying the length of the carbon electrode, which can be done instantly. It is interesting to note that no time is lost while waiting for the iron to heat up. The apparatus works only on a.c., and has two special electrodes, one a simple contact, the other a special carbon which, when it touches the metal to be soldered, forms an arc. For fine work the contact is replaced by a pistol-shaped holder for lead solder wire which forms the contact and, at the same time, distributes the solder evenly over the surface of the work in hand.

Securitex had a new type of electric cut-out which is plugged into a fuse block like an ordinary fuse. It consists of a small case containing a bimetallic strip which opens a switch when the current exceeds the limit for which it is set. The circuit is reclosed by pressing a small button fitted in the top of the device.

Single-phase Capacitor Motors

AN entirely new line of single-phase capacitor motors in sizes from 1 h.p. up to 15 h.p. (squirrel cage) and 30 h.p. (slip ring) is now being offered by the British Thomson-Houston Co., Ltd., Rugby, whose fractional h.p. (one-sixth to one h.p.) capacitor machines have been available for some time.

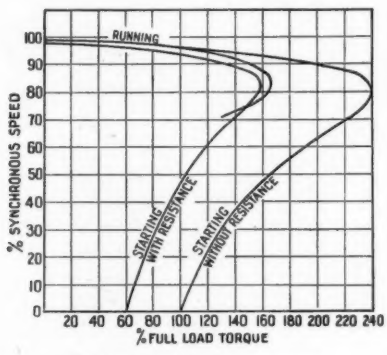
This type is claimed to be quieter running than any other single-phase motor, and to have superior efficiency, power factor, and a better starting torque per kVA, while the recent introduction of the electrolytic type of condenser for starting purposes has brought the price of these machines with their control gear down to a competitive level.



A 5-h.p., 940-r.p.m., slip-ring capacitor motor with drip-proof enclosure

This type can be made to approximate to a two-phase induction motor, both at starting and during running, and hence possesses the good characteristics and simple construction associated with polyphase design. The control gear embodies the starting and running condensers, in association with a robust change-over switch and a current-limiting device (where necessary) in a manner that enables the machine to both start and run virtually as a two-phase machine, which is claimed to be superior to the use of condensers merely for phase-splitting during starting and for power factor improvement only when up to speed. The scheme of connections of the motor windings, the condensers, and the switchgear must be such as to prevent dangerous voltages to earth forming at certain parts of any or all of these components. For this reason B.T.H. capacitor motors of 400 to 500 V have their auxiliary winding divided with the condenser system interposed between the two halves. This limits the highest voltage to earth to little more than half that which would obtain by the other arrangement.

The table hereunder shows the comparative starting performance of single-phase squirrel-cage and slip-ring capacitor motors with squirrel-cage and slip-ring induction motors and with the repulsion induction motor of 5-h.p., 6-pole, 400-V rating. In making this comparison, particular attention is directed to the necessity for comparing starting kVA instead of starting current in terms of full-load current, since the kVA value is independent of the efficiency and power factor of the motor, which together determine the full-load current.

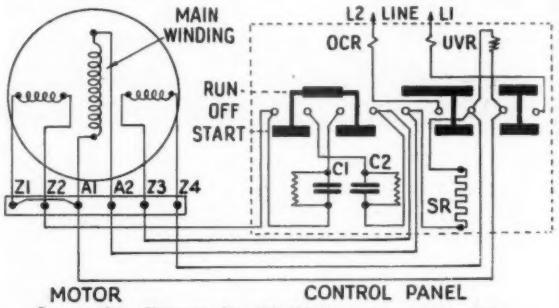


Typical performance curves

To a great extent the type of motor employed will be determined by the duty, that is, the starting torque required, and the starting current limitations imposed. For example, up to 1 h.p. either the split-phase squirrel-cage motor with automatic phase-cutting cutout or the fractional h.p. capacitor motor will be suitable, the former being the cheaper, but the choice will also depend on the standard of performance and quiet running required. For outputs exceeding 1 h.p. where the starting current limitation imposed is not too restrictive, either the repulsion-induction motor with direct-on line starting or the squirrel-cage capacitor motor will be suitable.

Where, however, strict limitation of starting current is imposed, as is very often the case, either the repulsion-induction motor with a simple rheostatic starter or the slip-ring capacitor motor can be applied equally in most instances. The choice will depend on the cost and the performance expected. It will, however, usually be found that the repulsion-induction motor with a rheostatic starter is cheaper up to about 5 h.p., at which size the capacitor slip-ring motor becomes a serious competitor.

The various components have been selected to give starting torque and current values that suit average conditions, and any alteration, therefore, may involve expensive changes. At the present time the B.T.H. Co. has selected the following performance data for motors above 1-h.p. output. (*a*) Squirrel-cage type, either 60 per cent. of full-load torque with a starting current of approximately 250 per cent. of full load at switch-on; or, alternatively, 100/125 per cent. of full-load torque with a starting current not exceeding 350 per cent. of full-load current. (*b*) Slip-ring type, either 200 per cent. of full-load torque with a starting current of approximately 225 per cent. of full-load current at switch-on, or any required reduced value of starting torque with correspondingly reduced current.



Connection diagram for 400/600-V s.c. capacitor motor

OCR. Over-current release. UVR. Under-voltage release. SR. Starting resistance. C_1 and C_2. Condensers.

These machines are substantially the same as the B.T.H. "Type K" polyphase motors. They have two stator windings and cast aluminium squirrel-cage rotors; are fitted with grease packed ball or ball-and-roller bearings; and comply with British Standard Specification No. 168. An overload torque of at least 150 per cent. of full load will be developed, and for each size a specially designed sheet-steel starting panel is available. The air-break drum-type switch has three positions: "start," "off," "run," and it cannot be left in the "start" position or operated in wrong sequence. An under-voltage release and two over-current relays are provided.

COMPARISON OF 5-H.P., 6-POLE SINGLE-PHASE MOTORS AT 400 V.

Type of Motor	Capacitor squirrel-cage			Induction squirrel-cage		Capacitor slip-ring		Induction slip-ring		Repulsion induction	
Full load, amps.	11.8			16.6		11.8		16.2		13.2	
Starting current, %	150	250	350	200	350	150	225	100	200	200*	350
Starting, KVA	7.1	11.8	16.5	13.3	23.2	7.1	10.6	6.5	13.0	10.5	18.4
Starting torque, %	25	60	100	25	50	100	200	50	100	75	250
Starting torque lb.-ft.	6.62	15.9	26.5	6.62	13.25	26.5	53.0	13.25	26.5	19.88	66.2
Starting torque, lb.-ft. KVA. ...	0.93	1.35	1.61	0.50	0.58	3.75	5.00	2.04	2.04	1.90	3.60

* With starting resistance.

Safer Plugs and Socket-outlets

THERE has been a British Standard Specification for two-pin plugs for many years, but three-pin plugs have only fairly recently been standardised. Even so, real interchangeability has not been universally achieved in practice, and it was possible for live parts to be touched during insertion or withdrawal. The Specification for three-pin plugs and sockets has been revised. It aims at ensuring that socket-outlets will be not only interchangeable amongst themselves but will also maintain interchangeability with those made strictly in accordance with the previous specification. "Freak" constructions are prohibited, but the standard design is such that "untouchability" is secured without sacrificing interchangeability. The new Specification also aims at eliminating trouble due to overheating at the contacts, which sometimes arises when the slotted pins of the plug become closed up after prolonged use. The pins are still required to be slotted (as otherwise it would not be possible to maintain proper interchangeability with some of the existing sockets), but they have to be of such construction that they are not compressible beyond the parallel position. In view of the alterations that will have to be made in manufacturers' tools and moulds, the new Specification will not officially come into force until January 1st, 1935, but copies of the Specification (No. 546-1934) are now available from the British Standards Institution, price 2s. 2d. post free.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Institution Membership

Apropos your leading article bearing the above heading, I would like to make a few comments.

I was successful in the A.M.I.E.E. examination eight years ago and am now thirty-one, having held the post of assistant consumers' engineer in a large municipal undertaking for more than four years. Two applications for transfer have been rejected by the I.E.E. Council on the ground of lack of experience, whereas I am constantly meeting persons who not only have never taken the examination but whose experience and knowledge are both open to doubt. Nevertheless, these people proudly add the title A.M.I.E.E. to their visiting cards and are apparently given preference when a vacancy for a public appointment occurs.

As I cannot afford the subscription as a graduate, which I believe is the same as that for associate member, the Institution is threatening to remove my name from its membership roll. I might add that I experienced the greatest difficulty in obtaining leave of absence for the purpose of sitting for the examination and that my own chief would not at first sign my transfer form on account of insufficient knowledge of me.

What encouragement is there to reach that "standard of professional attainment that is worthy of the dignity of our profession"?

L. MORGAN SMITH.

Banstead, Surrey, *May 30th.*

I am interested in Mr. Rapson's letter in your issue of June 1st, having held during the last six years ten temporary posts, only twenty per cent. of which are recognised by the I.E.E. as responsible positions. Apparently Mr. Rapson has in mind certain advertised vacancies when he states that most employers give preference to an A.M.I.E.E. Is he not aware that these are inserted in the Press, in many cases, only in order to conform to regulations, the candidates being already chosen. Several of my financially successful acquaintances in the electrical industry are not members of the I.E.E. It is well known in the trade that many of the older A.M.I.E.E.s merely purchased these initials, when they were in little demand, and the revised A.M.I.E.E. (by examination) is popular amongst the younger members who do not also possess a university degree.

It has come to my knowledge that a few have successfully requested their employers to give the position held a more high sounding title, in order to satisfy the I.E.E. selection committee. A chief of an important drawing office in one large company is classified as a junior draughtsman—the financial reason being an old scale of wages for different grades.

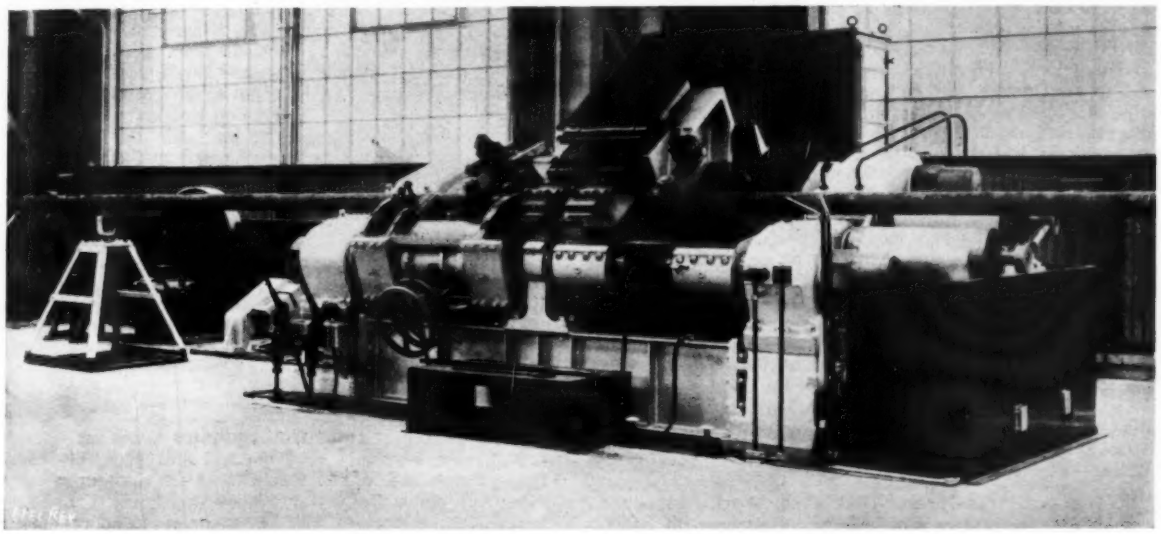
The general public is now hopelessly confused as to the meaning of the various suffixes. The cut-price electrical and wireless shop proprietor adorns his facia with fancy initials, which he purchases for several guineas, instead of exercising a little imagination and using the whole alphabet for nothing.

London, E.10, *June 2nd.* W. PENSTONE.

What is Ohm's Law?

I am glad to be reminded by Mr. Perrin of Professor Silvanus Thompson's pronouncement on this question, which I heard. It ought to settle the matter. I am not sure that I understand Mr. West's comment on his quotation from my letter: "So Ohm's law is not quite so simple!" It may be that he has failed to notice the distinction between the "E" of Ohm's law—that is the algebraic sum of all the e.m.f.s acting round a circuit—and the voltage drop across a bit of a circuit.

Perhaps an illustration will help. Take a battery of e.m.f. E, and internal resistance r, connected to an external resistance R, which contains no other source of e.m.f. The current will be $A=E/R+r$. A voltmeter across the battery terminals will read AR volts, not E. AR is the drop across the resistance; it is also the voltage across the battery, which is certainly not Ar; in fact $AR+Ar=E$ (assuming that the battery e.m.f. is not altered by the passage of the current), and Ar is the voltage drop across the battery due to its internal resistance; r can be found by taking voltage readings with two values of current. This is, the resistance of the battery "obeys Ohm's law," although the voltage at its terminals drops with an increase of current through it. That is a simple case where the internal e.m.f. and voltage drop through a bit of the circuit are in opposed directions.



The large B.I. butt-welding machine described on page 853

As to what is a "pure resistance," I think that a general definition is that it is a bit of a circuit in which there is no source of e.m.f.; a source of e.m.f. may be an inductance or capacitance manifested while the current is changing in value—a galvanic couple, a thermal couple, inductance from another source; perhaps this does not exhaust the list. I am inclined to think that Mr. West's own definition is not so bad if slightly expanded to the form: "It is the property of a circuit or bit of a circuit in virtue of which heat is evolved proportional to the square of the current through it." One very general criterion might be that with an alternating e.m.f. the current and voltage waves are in phase and symmetrical. As for your own comment, Mr. Editor, I cannot see why it is "arbitrary" to say that the impedance of a neon tube is not a resistance; it seems to me to be an indisputable example of an impedance which is not a resistance. HENRY M. SAYERS.

London, S.W.16, *June 3rd.*

Dangerous Wiring Methods

The article by Mr. A. H. Dykes in your issue of May 25th calls attention to the necessity for the inspection by some authority of electrical installation work, much of which is being carried out by persons who are ignorant of the dangers which lurk behind inefficiency and constitute a serious menace.

Unfortunately many supply authorities, in their zeal to increase their connected loads, appear to have lost sight of their authority to refuse to connect an installation where an element of danger to life, property, or continuity of supply exists, and by reason of their failure, either because of the indifference of their employés, or because they don't care, have allowed circumstances to develop which have resulted in loss of life. Most supply authorities stipulate that work shall be carried out so as to comply with the I.E.E. Regulations or base their own regulations on the I.E.E. Regulations which are ample to safeguard against almost any conceivable danger, but how seldom do they attempt to enforce them?

In how many cases is the bonding of lead-sheathed cables carried out efficiently, if at all, and in how many cases do supply authorities carry out any test to find out? Steel conduit systems are being installed to-day without any attempt to secure continuity; although an earth wire is attached to the conduit at the main board and duly connected to earth, little heed is paid to the minimum cross section of earth wire and the manner of its support.

Then there is t.r.s., the "dabbler's friend," buried in plaster without any attempt to protect it against the nail which will ultimately be driven into the live core and remain alive, a real danger to be detected later by some unfortunate person. Or an attempt is made to overcome this difficulty by inserting pieces of conduit in the plaster, without dressing or bushing the tube ends, and stringing the t.r.s. the shortest way there so that these tubes will certainly become alive by and by.

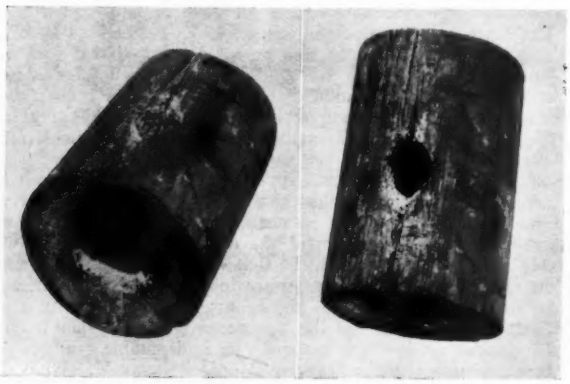
I recently found three flush switches in a common box with metal dollies and an insulated switch plate; the switches were supplied from separate circuits, and had been inspected and connected. Again, in a factory which had been operating for over a year I found that no attempt had been made to earth either switches, starters, fuses, motors or conduit, and the machine operators admitted that they had frequently received shocks while starting or stopping the machines. This installation was connected to the supply authority's 460-V, three-wire system, and presumably had been inspected previous to connection. My written report to the people concerned still remains unanswered and the loudly advertised "electrical engineers" who did the job still succeed in keeping the *bona fide* electrical engineer from getting any business.

Something must be done, and done quickly, to rescue the electrical contracting business from the disrepute into which it is in danger of falling at the hands of unscrupulous and incompetent persons with no pride in their profession whose only aim is to make pots of money. I would suggest that some endeavour be made to ensure that no person shall be allowed to engage in electrical contracting without demonstrating his ability to carry out the work in a proper manner. A licence or permit should be given which would be cancelled if the standard of work fell below the prescribed level. The builder should not be allowed to become the authority to say what the standard of work shall be. On more than one occasion recently I have been told by builders that they do not care what sort of job is done so long as they sell their houses.

June 2nd. J. O. D.

A Woodpecker's Wicked Work

Some of your readers may be interested to see the accompanying photos of what the woodpecker pecked. The pole carried an 11,000-V three-phase circuit and was erected in the Colchester area in 1930. So far as I know, this is the only



Damage done to a pole by a woodpecker

pole that has been attacked out of many thousands that have been erected.

When the bird's attentions had been discovered the pole was removed, the hole probed and a saw cut made at the bottom end of the hole which is 3 in. in diameter at the point of entry, 4 in. in diameter vertically and 9 in. in depth. We hope the meal disagreed with him! W. C. C. HAWTAYNE, M.I.E.E.

London, E.C.4, *May 29th.*

Electrical Contracting Troubles

We shall be grateful if any of your readers can give us the benefit of their advice regarding a practice which is calculated to give sub-contractors many sleepless nights.

As sub-contractors for electrical work on a certain job, we became alarmed during the performance of the contract regarding the stability of the builder, who was the general contractor. We appealed to the architect on this point, but his explanatory assurances only increased our doubt of the builder. Further inquiries showed that the builder owed money generally. Again we appealed to the architect to take definite steps to secure our position. He referred us to the quantity surveyor, who listened sympathetically and understood our position but could do nothing.

Two months have passed since this contract was completed and we are told that the quantity surveyor's work should be completed in about another month, when it will be passed on to the architect for his attention. In the meantime, the financing director of the building contractor has resigned from the board of his company.

In these circumstances, to whom should we appeal to ensure that money still owing on this job should be paid, we suggest, into a joint banking account, operated by appointed trustees in such a way that the builder cannot liquidate final certificates without regard to the payment of sub-contractors in full? As things are, it only requires the builder to go into liquidation and for his wife to hold a substantial debenture on his business for the money owing to sub-contractors for the work they have carried out to go straight into her pocket.

To further indicate the very raw treatment on this job, may we catalogue briefly other happenings? : 1. The builder's order merely accepted our quotation less 2½ per cent. cash discount. 2. The builder deducted 2½ per cent. from small payments on account, although it took us six and seven weeks respectively to obtain payments. 3. Subsequent to the placing of the order, the architect asked us to order electrical material from suppliers at net cost prices secured by him under the 1931 R.I.B.A. Contract and he has resolutely ignored our request to be allowed even 5 per cent. to cover our costs of ordering. 4. At the end of the job, when work has actually been completed, we are told that there is a 10 per cent. retention, including all moneys spent, even under Item 3 above. 5. The builder and architect ignored our requests for a copy of the contract and schedules.

We have never experienced such treatment as this before and are frankly at a loss to know quite what to do.

MORTIMER, GALL & CO., LTD.,
J. Mortimer Hawkins, *Managing Director.*

London, E.C.2, *June 2nd.*

Industrial Supplies

With vast interest I read the I.M.E.A. paper of Messrs. H. C. Lamb and W. E. Swale. As an engineer-in-charge using both public and privately generated power, I would put forward a few reasons why more power consumers do not "go on the mains." The consumer has no serious objection to paying a fixed charge varying with his maximum demand, although this should be reset and charged per month, and not quarterly and yearly as is at present the custom. I could often have given extra load to the undertaking for part of a month, but the indicator being reset quarterly this would have proved too costly and the load had to be carried in other ways.

The consumer does object very strongly to paying the coal clause charge, which may raise his costs by an amount over which he has no control. His principal objection to this charge is that while he is taking his own business risks he does not feel called upon to stand those of the supply authority also. He says, and quite naturally, that the domestic consumer has no coal clause, why should the power consumer? Therefore he promptly assumes that he is being exploited, for the time being, while the domestic load is placed upon a sound basis.

Again I would refer to Mr. Jas. McCartney's letter in your May 25th issue. The business man who is accustomed to bargaining for his goods is annoyed when the supply authority approaches him in a "take it or leave it" manner. Many valuable loads could be secured by supply authorities if they would just concede some small amount or be prepared to negotiate terms. Many business men will negotiate where they will not listen to stated hard and fast terms; it is distinctly against their time-honoured customs. Supply engineers have my sympathies in this matter as I know that they have not the authority to negotiate.

Finally, I would refer to a letter by Mr. F. S. Sparrow in your April 6th issue. He has an all-electric house near Brighton. He pays 0.625d. per kWh all in for 8,500 kWh per annum. My firm, which buys from the local authority about 250,000 kWh per annum at a load factor of over 30 per cent. (Sundays included in the calculation) and power factor corrected to unity, cannot do better than 0.7d. per kWh, and great care has to be taken to obtain this, notwithstanding the fact that the works is situated in an industrial area in Lancashire whose supply rates for power are as low as any in the country.

Power rates should be lower than any other. The industrial loads are, after all, the backbone of supplies of any size.

June 4th. DELTA.

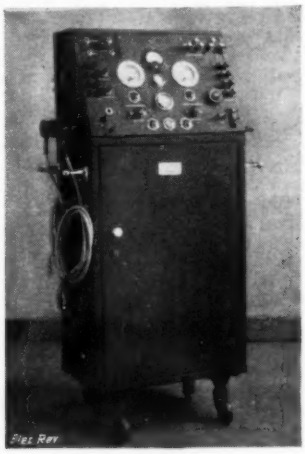
New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Portable Tester for Garages

It is claimed for the newest "Dynatest" supplied by the RUNBAKEN CO., 280, Deansgate, Manchester, that it will make fifteen tests upon the dynamo and electrical equipment of a motor car, enabling its conditions to be easily checked or faults to be quickly traced (the results being recorded on a report form supplied by the company). Most tests can be made without removing components.

The equipment of the "Junior" model includes a moving-coil 15-0-15 ammeter, a 5-0-30 voltmeter, a pole finder, contacts with luminous indicators, a change-over switch from 6 to 12 V, means for restoring residual magnetism, a high-frequency current armature tester with audible signal, an internal buzzer for tracing short-circuits, open-circuits and switches, and lamp tests. The panel is of ebonite with appropriate labels in a cast-aluminium core and the finish is in black with chromium or nickel-plated mountings. The dimensions are 12 by 9¼ by 3¼ in. and the weight 8¼ lb. The price is £10 10s., but a combined millivoltmeter and starter test ammeter can be provided for an additional £2 10s.



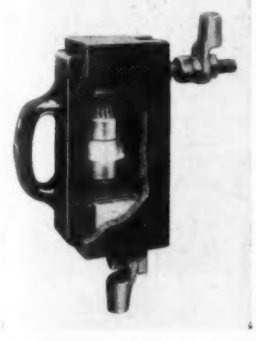
The "Dynatest"

The "All-in" model is similar, but an ammeter (300-0-300 A) which indicates the current taken by a motor starter under load with a millivolt scale (30-0-30) for armature drop test, a hand-operated (150-3,500 r.p.m.) coil, condenser and magnet tester, and a resonant plug tester. It is mounted on a stand with provision for holding battery or tools and measures 18 by 15 by 6 in. The price is £29 10s., or £35 including insulation tester fitted with ohmmeter and hand and h.v. tester.

L.V. Network Fuses

A feature of the ranges of semi-enclosed and heavy-duty cartridge-type fuses developed by MESSRS. A. REYROLLE & CO., LTD., Hebburn-on-Tyne, is the interchangeability of the bases of the two types and, in the smaller sizes, of the fuse holders also. This enables the cartridge type to be substituted for the other when severer operating conditions necessitate the change; cartridges of lighter ratings can also be adapted to fuse holders designed for the higher ratings.

The fuse holders have self-aligning contacts, which engage with fixed contacts arranged for either back or front connection. The contacts can be supplied (*a*) fitted in insulated troughs as complete units, except in the largest size, (*b*) loose for mounting on a customer's panels, or (*c*) mounted on a slate panel. The moulded insulation troughs have been designed to prevent accidental contact with the live parts, which are shrouded. The semi-enclosed fuse assemblies are available up to 600 A and the cartridge fuses up to 700 A at 660 V either a.c. or d.c. The former are suitable for conditions in which the three-phase short-circuit kVA is less than 3,000 for capacities up to 100 A and less than 5,000 kVA for other sizes.



A Reyrolle cartridge fuse

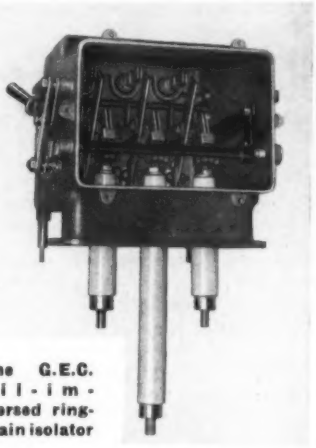
The fuse holders are of moulded insulating material and are fitted with self-aligning contacts. The fusible element consists of tinned copper wires threaded through an asbestos tube and fixed to the holders by accessible clamping plates. For the cartridge fuses, which are capable of dealing with three-phase short-circuits of 25,000 kVA, the fusible element consists of a number of strands of silver wire and one strand of high-resistance metal, each wire being threaded through a separate hole in spacers within an insulating core. The ends of the elements are connected to copper tails, and the space near the junctions is filled with an inert arc-quenching substance. The tails extend through tinned brass end caps to which they are soldered.

The maximum current ratings of the six sizes of semi-enclosed fuses are from 60 to 600 A, and of the corresponding sizes of the cartridge fuses from 30 to 700 A, with prices ranging from 10s. to £4 18s. for a complete assembly of fuse holder, fixed contacts, and slate base without shrouds. The cartridge fuses are supplied at from 24s. to £12 10s. per doz.

Oil-immersed Ring-main Isolators

For supplying rural and other isolated areas, a reliable method of distribution is to tap ring-main feeders, thus providing a dual source of supply and minimising the risk of a complete shut-down. The GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, has therefore developed a switch for isolating either side of the ring main. It can be incorporated in a large range of switchgear, and comprises oil-immersed three-phase moving contacts of the knife blade pattern with fixed contacts of the line contact controller type. Simultaneous operation of the three phases is ensured by a system of steel levers.

To prevent any risk of incorrect or unauthorised operation it is completely interlocked by means of stops padlocked in their appropriate positions; this method complies with Home Office regulations. Normally one stop is padlocked in the "off" position so that the switch cannot be swung direct from the "on" to the "earth" position; this stop must be deliberately removed before the "off" position can be passed. The stops are also used to lock the operating handle in any of the three positions.



The G.E.C. oil-immersed ring-main isolator

The fixed contacts in the "on" and "earth" positions are mounted on porcelain insulators, while the moving contacts are insulated from the operating mechanism by bakelised paper beams. For testing and earthing the feeder cables, contacts are mounted on porcelain insulators which project through the silicon-aluminium casing, the outer terminals being enclosed by a padlocked cover. The main earthing cable socket and a removable copper link that normally connects the three terminals are secured to one of the studs holding the cover, so that the testing and earthing terminals cannot be unearthed without removing the cover. The testing terminals are only connected to the feeder cable when the isolator is in the earthed position, and therefore the insulators are not subject to high voltage except during periods of testing, while there is no need to interlock the cover with the operating mechanism.

The Kubex Cooker

At the unusually low price of 37s. 6d. MESSRS. KUBEX, LTD., Swan Street, Preston, are marketing an electric cooker with an oven and griller only.

The oven has a fixed loading of 900 W and gradual heat regulation is obtained because the element is placed between the oven and the griller, where it is held in a metal guard, two movable vanes being provided one on either side of the element plate so that all three form the floor of the oven when the vanes are closed. The control dial lowers or raises the vanes as required. When the vanes are lowered the heat rises into the

The Kubex cooker with the variable control on the right

oven, and when they are closed the heat is reflected downwards into the griller. The dial is graduated in degrees, and the heat necessary for various kinds of food is also indicated.

"Sparton" Refrigerators

A "Sparton" refrigerator

The "Sparton" range of refrigerators is now being sold in this country by MESSRS. DRAKE & GORHAM WHOLESALE LTD., 77, Long Acre, W.C.2. Six models are available, all finished externally in baked white lacquer on rustproof steel, while the interior is in one-piece stainproof porcelain with rounded corners. The small model, No. 464, has a food storage capacity of 4.4 cu. ft. and a shelf area of 8.5 sq. ft. The height is 52⅛ in., the depth 19 5/32 in., and width 23⅜ in. A little over 4 lb. of ice (42 cubes) can be made.

Corresponding figures for No. 574 are: food storage, 6 cu. ft.; shelf area, 12.4 sq. ft.; height, 53 in.; depth, 26½ in.; width, 27⅜ in. Ice: 6.7 lb. Other models are available with food storage capacities of 7.2, 8.8, 10.5, and 12.6 cu. ft., and shelf areas of 14, 16.7, 16.5, and 20.9 sq. ft. respectively.

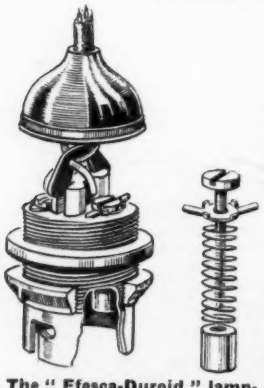
All models have an "antifrost" clock, a porcelain evaporator, cold regulator, sliding shelves, automatic internal illumination, egg rack, and a press-open latch.

A Burglar Alarm System

The "Sentinel" burglar alarm system which is being introduced by "SENTINEL" SERVICES, LTD., 75, Robertson Street, Glasgow, C.2, and which we saw demonstrated recently by means of special equipment, should, we think, give even the most expert burglar something to think about. It employs two sets of signals—mains-operated external equipment and internal units operated by batteries, the closed-circuit principle being employed. If the mains supply fails, the internal battery signals are operated at once through a relay, and, similarly, if the local wiring between the signals and the controller is disconnected or short-circuited the external mains signals function immediately. As soon as the mains current is restored the internal signals cease to function and the whole alarm system is reset to normal.

After the time allowed by police authorities for the operation of audible alarm signals has elapsed the external audible signal is automatically stopped, but the flashing beacon signal continues to operate. Standard alarm signal-circuit devices—door and window switches, panel wiring and window frames, &c.—are employed, as well as floor-operated mercury switches for protecting such special points as strong rooms and safes. The whole system is governed by a Yale-type lock, controlling a mercury switch, which can be situated at any desired position—internal or external. The switches are not affected by normal vibration.

A Solid-plunger Lampholder



The "Efesca-Duroid" lampholder

A solid-plunger lampholder has been developed by MESSRS. FALK, STADELMANN & CO., LTD., 83-93, Farringdon Road, E.C.1. It bears the trade name "Efesca-Duroid," and has a solid plunger with a large, flat contact face. The collar is moulded to form part of the liner, and ensures that the dome and the shade ring are always screwed down to their correct positions on the liner. A special terminal which cannot cut the flex is used, and the cord grip is self-adjusting to take any flexible up to and including 40/36.

Both the shade ring and the edge of the dome are bevelled, and a brass lining strengthens the lower part of the liner. The standard finish for this lining is mottled walnut, but plain "Duroid" brown can also be obtained. With a shade ring the price is 6s. 8d. per doz., sprayed white "Duroid" finish being 2s. 4d. extra, and a H.O. shield 2s. extra.

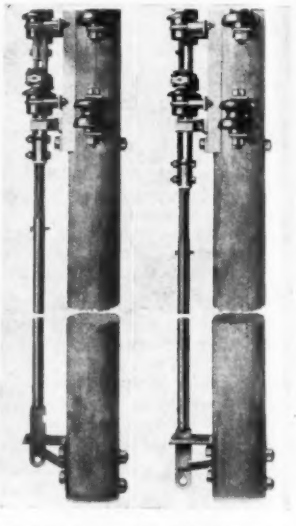
An Unusual Toaster

An ingenious electric toaster made by the COOPER-STEWART ENGINEERING CO., LTD., 136, Long Acre, W.C.2, will toast two full slices of bread at the same time. It will also toast sandwiches, and the filling cannot fall out. Dust and crumbs cannot do any damage as they are collected in the hinged heat reflector tray which is snapped open and wiped clean. When the toast-rack has been turned over a special waffle-iron may be inserted in its place, and will make a three-section rectangular waffle.

The appliance is finished in chromium plate with black bakelite handles and the price is 30s. for the toaster and 10s. for the waffler, the loading being 600 W.

Low-voltage Pole-mounting Isolators

A low-voltage isolating switch designed by MESSRS. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Holborn Viaduct, E.C.1, for pole mounting is available for two, three, four and five-wire lines. The capacity is 150 A for 440/260 V systems. It is intended primarily for overhead lines erected in vertical formation, and as it fits practically flush with the pole and embodies brown glazed porcelain insulators it is inconspicuous.



A close-up of the Henley unit: "off" position (left), and "on" position (right)

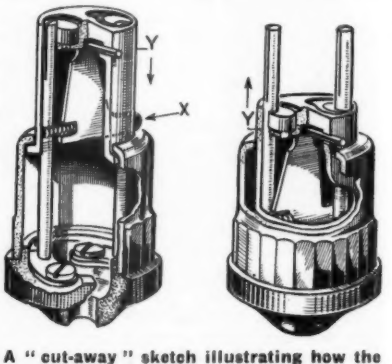
The units (one for each line) are mounted on an angle iron framework 7 in. apart. The tinned copper switch blades are self-aligning and are located within limits by phosphor-bronze spring washers between perpendicular insulating bars. The quick-break mechanism comprises a robust tinned phosphor-bronze spring mounted at the top of the galvanised mild-steel tubular operating shaft which "shoots" the contact blades into the "off" position when the spring is compressed by an upward thrust. A hook rod is necessary to operate the switch from ground level and a special brass top for mounting on a suitable wooden pole is available. The arrangement of the lower part of the operating shaft enables the switch to be padlocked in either the "on" or "off" position.

A Luminous Switch Indicator

An electric switch indicator which glows through the action of a powerful radio-active substance is being made by CELGLO LUMINOUS SIGNS, 154, Clapham Park Road, S.W.4. The luminous matter appears, from the sample we have examined, to be of unusual brilliance, and types for both flush and sunk switches are available at 10½d. each, in deep cream, pale blue or green, or stone colour.

A Combined Plug and B.C. Adaptor

An examination of the new "Union" adaptor which has been sent to us by MESSRS. A. P. LUNDBERG & SONS, LTD., 477/489, Liverpool Road, Holloway, N.7, has shown that the adaptor is unique in design and construction and at the same time quite robust. It can be used, as a single unit, both as a b.c. adaptor or as a two-pin plug; to convert it from a b.c. adaptor, the catch "x" is pressed in and the cylinder "y" is pushed down to reveal the two points of the plug.



A "cut-away" sketch illustrating how the new "Union" adaptor can be used as a plug or b.c. adaptor

A feature of the adaptor, which is of black bakelite, is complete safety under all conditions; "ever-set" pins are used, in which it is impossible for the slots to close up, and the b.c. contact plates are sunk below the surface of the bakelite, so that a barrier bridge is formed between the two plates, and between each plate and the side of the lampholder.

Low-priced Cooking Utensils

MESSRS. GIRLINGS, LTD., have drawn our attention to the fact that the three heats on their saucepans and porringers are not obtained by means of a three-heat switch, as stated on page 599 of our issue of April 27th, but by a three-pin plug which can be placed in three different positions.

"What Lancashire Says . . . ." By V. W. Dale*

The unofficial side of the I.M.E.A. Convention

LANCASHIRE has spoken . . . . and according to political tradition Britain is now expected to do something about it. Lancashire has spoken—electrically. A county which boards and lodges nearly one-fifth of our entire population has given a royal reception to twelve hundred delegates at the thirty-ninth Annual Convention of the I.M.E.A.

If any had doubt about the venue for this year's Convention those doubts were immediately dispelled by President Robinson, whose " bulk supply " of presence and personality, power and persuasion always appeared to be at less than an arm's length encouraging and enthusing every one of his twelve hundred guests.

The Liverpool Convention has unquestionably made a great mark for itself in electrical history—the spirit which pervaded it definitely presages a new and more prosperous electrical era —the signal for a great advance in which perseverance, honesty and horse-sense promises to break down the last strongholds of prejudice and misconception which have continued to persist amongst some of those who control and use this public service.

The first thing to greet visitors at St. George's Hall was an illuminated sign erected by E.D.A. on the Liverpool Corporation stand: its all-embracing and enthusiastic message was provided by the simple words " Electricity for All." It was this same message that dominated every formal and informal discussion at the Convention. Indeed, the gracious act of H.R.H. the Duke of York, who rose a second time to address the Conference at the annual dinner, was not only a well-deserved tribute to the President but a testimony to the enthusiasm which is now engendered by contact with the public service of electricity.

A Busy Time

In every walk of life you will find people who affect to condemn annual conferences as joy rides for privileged sections of the community. Most of us started *this* joy ride at 8 a.m. or earlier, and continued at high pressure throughout the day and night until 2 a.m. or later, when inwardly conscious that we had conscientiously " something attempted, something done," we retraced our steps to the Adelphi or to a less pretentious but equally hospitable hostelry feeling that we had honestly earned our night's repose which lasted at *least* four hours and at *most* five. Writing these notes on Sunday afternoon a few hours after returning from the North, I, like many others, feel a wreck more than a rejuvenate.

It was worth it——perhaps as much for the informal part of the Convention as for the official part of the proceedings—those hundreds of informal discussions, stripped of the garnishing of official verbiage and free from stage-fright, or fear of the technical Press reporter, when the engineer of Blankety-cum-Blank really let himself go—unofficial unreported discussions, full of experience, pregnant with power to bring about unprecedented growth of an already great industry. One per cent. of the talk was probably occupied with stories worth listening to—one per cent. to stories scarcely worth listening to—but let there be no shadow of doubt the bulk of the remainder of the time was devoted in all seriousness to *shop*.

For instance, there was one engineer who told of the antagonism he encountered, the vested interests he had to overcome, in getting a simple hire scheme adopted. He was able to direct anyone in similar difficulties on to the road which had led him to success. He was able also to tell us that during the last two years he had been hire-purchasing apparatus. Two years ago his flat rate was 2½d. per kWh. He now has a two-part tariff with a ½d. rate or ¼d. for water heating and (in that short time, please note) one consumer in ten has electric water heating installed. It has not been all plane-sailing. He has been up against a very powerful gas company; he has had to face a regular artillery of advertising; it has required courage, endurance, augmented staff—but he has shown that *it can be done*. On a similar basis there should already be at least half a million water-heating consumers.

A Jointer's Record

Did you hear of the story of the jointer who, in a competition amongst the staff and workpeople for obtaining more consumers, brought in nearly 350 signed application forms? He won a prize and he assuredly deserved it. Call it what you will—team work, keenness, enthusiasm, inspiration—it means that if everyone of us had a similar achievement to our credit we should have wired three times as many houses as there are in this country.

How is it done? It is only a small undertaking: it has its football and cricket teams and social clubs and other means for establishing a hundred per cent. team spirit. The men feel that they are a part of the undertaking and the undertaking the whole of themselves. There may be difficulties in developing on these lines—trade organisations, district auditors, personal prejudice, or an " anti-stunt " complex—but one municipal engineer at least has done it and done it with conspicuous success and that is enough. Fantastic as it may sound, if an average of twenty or thirty employés per undertaking found it possible to do what this humble jointer has actually done, we could in a matter of weeks sign up five million new consumers and bring about as nearly as possible electrical saturation so far as connections are concerned.

Adequate Sales Staff

Inadequate staff appears to be serious and far too generally a handicap to development in many areas. It was heard at Liverpool that one undertaking has a sales representative for every two thousand consumers and that each representative more than pays his own salary. If, as a result of such informal talk less enterprising committees secure a clearer appreciation of their staff problems and get a little nearer to this prescribed basis, the Liverpool Convention will have been worth while.

Switching over to a rural area: there was an engineer at the Convention who told of a village consisting of 230 small houses which went 100 per cent. connected in less than a day. Every house had been canvassed, forms signed, houses wired, and all were connected to the supply in the act of switching on the new area. And in the same small hamlet of " shillings per week " householders two days' display and demonstration realised cash sales of £250 worth of appliances.

In another undertaking, situated in an industrial garden in the Midlands where the modest penny is a coin of some importance, the engineer is a psychologist, although he is so modest that he would probably blush if you told him so. He attempts to sell nearly everything in pennyworths. Listen to the message of his showcards and advertisements: " This cooker is yours and it is installed free for a penny a day." At the end of six years payments cease—but all the time the consumer is the proud possessor of a modern vitreous-enamelled cooker, and at the same time the possessor of the responsibilities which ownership implies.

Here is a solution of the early returned cooker problem: the same idea is extended to water heaters and other appliances and to the lighting point—a penny a week, " the price of two cigarettes " he points out in a very telling local advertisement.

The Value of Exhibitions

An engineer tells how he secured between 400 and 500 applications for cookers in a week. Another how his sales jumped up to £5,000 in a similar short period. The engineer who does not believe in exhibitions can learn how to get as many people to spend five or six hours at an exhibition in one week as he could get to spend as many minutes in his showroom in a whole year.

The 1934 Convention revealed a growing appreciation of the need for more intense publicity and selling. Engineers are studying and pursuing methods of publicity as they have never done before and devoting the E.D.A. recommendation of one per cent. of their revenue to that branch of their work. Some are not—but they cannot fail to have been inspired by the scores of testimonies they heard of which the foregoing are merely a few samples.

In the task we have before us there is a time for quiet which is conducive to good thinking and good working—there is a time also for the despised faculty of talking, for the interchange of experience and successful experiment. In many places the result of such talks at Liverpool should be seen very soon in a sharp vertical lift in the sales curve.

Television Terms and Definitions

The Research Committee of the Television Society has defined photo-electric (light sensitive) cells in the following way:—(1) A light sensitive cell is any device in which modification of its electrical properties occurs on illumination; (2) a photo-conducting cell is one whose electrical resistance varies with the illumination incident upon the cell; (3) a photo-electric cell is one in which electrons are emitted from a metallic surface under illumination; (4) A photo-electrolytic cell is one which depends primarily for its action upon the Becquerel effect; (5) a photo-voltaic cell is one in which a difference of potential is developed across the rectifying contact between the surfaces of a semi-conductor and a metal under the influence of illumination; this potential difference gives rise to a current in an external circuit.

* Business Manager, British Electrical Development Association.

"Nursing" the Consumer. By A. G. Connell

WHEN it is considered what enormous collective and individual effort is represented by the Central Electricity Board, the British Electrical Development Association, the Electrical Association for Women, the technical Press, the makers and users of both heavy and light domestic electrical equipment, it is appalling to find that the only activity in the front line trenches of many electrical undertakings is the reading of meters and the presentation of bills.

A friend of mine moved into a house in the suburbs of London about nine years ago. The supply company was advised a week ahead of the move in. Instead of inquiring whether power points and appliances could be supplied, the company seemed reluctant to send a man to connect the meter; in fact a strong letter had to be sent after the move before the supply was available. A complete set of fittings and some appliances were required, but this aroused no salesman's interest. Up to the present date only calls to read the meter have been made on this consumer, whom I know is quite electrically minded.

A Striking Contrast

The gas company, on the other hand, sent an inspector round while the connecting up was being done. He was most attentive and brought some attractive booklets of appliances and prices, and made some most helpful suggestions. It was found that most of the gas pipes had been carefully cut and plugged, and in some cases removed, and this work appears to have been carried out free of charge. The gas-meter reader always arrives at that house with some new idea with which to interest the housewife. He is keen on his job and makes his subject really interesting. I have since found that his company gives its meter readers lectures and demonstrations on appliances and the art of gaining the confidence and interest of the consumer.

Periodically a personal invitation arrives on good class stationery requesting the housewife to mention any dish in which she is specially interested and would like cooked at the forthcoming demonstration at the showroom to which she is invited. Then the skill with which the interest is drawn gradually to the larger subjects such as refrigeration and heating is amazing. The staff is thoroughly keen and is anxious to advise and help. Incidentally they are all shareholders in their company, and strikes are unknown.

The electricity supply company in that district also has demonstrations at its showrooms but to find out when they take place one has to go round and study the notices in the window. The address of the showrooms is given on the back of the bill, but there is no personal appeal. If the company is unable to raise a little enthusiasm on its own part how on earth can it expect to make others interested enough to come along to ask questions and to spend money?

Those in charge should have the gift of encouraging their sales staff to that pitch of inspired enthusiasm which will carry them through the rougher patches cheerfully. When it is realised how efficiently some undertakings run their sales departments, it is to be regretted that those others who lack the imagination and energy do not at least imitate their brighter contemporaries.

In his article in the ELECTRICAL REVIEW of May 18th Mr. H. Smith referred to the value of approach to consumers without deliberate canvassing. What finer opportunity is there than the occasion of reading the meter or the settlement of the bill for the period? How naturally arises the question of value of service for the money expended. Here is a golden chance for the question of the suitability of the tariff to be reviewed, for the old bugbears of the consumer to be disposed of, and an atmosphere of friendliness engendered.

Personal Contact Essential

Recently I was fortunate enough to be shown around six or seven supply undertakings, town and country, to observe their methods, tariffs, showrooms, forms of agreement, and general development, and found it an absorbing study.

I wonder how many sales engineers in this country take the trouble to select and train their men for the different classes of districts with which they have to deal? It is possible that more development can be done by personal friendly service of the right type of consumers' engineer, or even meter reader, than by a mass drive or campaign with beating of drums. The consumer must be made to feel that he or she is the one person that the electricity people are most anxious to please. It is well known that a satisfied consumer will do more good in a district than much house-to-house canvassing.

Naturally, forced or over-development in the poorer areas is harmful and must be avoided. The salesmen must have the full support of the undertaking in the matter of tariffs, service, hire-purchase facilities and showrooms which will makes the less opulent of its clientele feel really welcome. One of the London companies which I visited has arranged with clever foresight and discrimination each of its showrooms to fit in perfectly with the type of dwelling in the particular district.

I have made a collection of forms of agreement recently and while some are short, simple and to the point others are terrifying to a great many of the would-be consumers. One form of agreement is so complicated that a paragraph was inserted to the effect that on receipt of notice the power company would send round a man to assist the victim in the filling up of the form. We must throw these forms overboard and get the simplest possible if we are to expect free and rapid development, especially in the new housing areas.

Remove the Restrictions!

It may be that some undertakings require legal cover and cash deposits before giving a supply; they may have excellent reasons for these precautions, but strangely enough a good many gas companies will send a man to connect up on receipt of a telephone call. Perhaps it is that only the good citizens use gas and the bad ones seek to use electricity. Surely the huge undertakings do not need these complications when the small shopkeeper runs his hire-purchase so simply.

In these days of fierce competition we must get down to it. The man who sells domestic service need not be a supersalesman, but he must truly understand the people with whom he is dealing. He must have much patience, common sense and be keen on his job. The householder is far more likely to be advised and guided by someone who has taken the trouble to study his point of view. The man who can discuss domestic budget figures freely is bound to arouse the consumer's interest and he is the man to return to his undertaking with information and reasons for growth or otherwise of various types of domestic load.

I hold no brief for gas companies, but they compel admiration for the thorough manner in which they make progress by personal contact. Because I am an electrical man myself, I am anxious that none of our side should lag behind.

New Books

Kelly's Directory of Merchants, Manufacturers and Shippers of the World. Two vols. Pp. 2059 and 2176. London: Kelly's Directories, Ltd. Price £3 4s.

A completely new and revised edition of this colossal work appears every year, and this is the forty-eighth edition. The work covers the whole of the world; it is copiously indexed in four languages, and contains a fund of facts and figures of value to the business man, no matter in what class of merchandise he may be interested. Vol. I deals with foreign countries and their possessions, and Vol. II with Great Britain, India, and the British Dominions, Colonies, Protectorates, Dependencies and Mandated Territories.

Design of Alternating-Current Machines. By K. ASTON. Pp. 365; figs. 202. London: Humphrey Milford. Price 16s.

The completion of the grid and the standardisation of the a.c. supply system has led to an enormous increase in the extent to which a.c. as compared with d.c. machines are employed. Mr. W. J. Belsey, of the B.T.-H. Co. has stated that of every 100 electric motors made in this country eighty are a.c., so the importance of the study of their design needs no emphasis.

In the past, to a certain extent, this subject has been dealt with in text-books largely by means of empirical formulæ. Within recent years, however, there has been a growing demand for a more accurate presentation of the subject, and we have witnessed the gradual application of mathematical and physical theory to the problems of design, while the data obtained from experimental investigations as well as from commercial tests have also been subjected to mathematical analysis. The results of all this labour have hitherto appeared mainly in papers presented to the various electrical institutions and to the technical Press. The author has been quite successful in welding together all this information for presentation within the covers of a book of moderate dimensions.

This method is based upon the "Ag B" system of design, as used by Professor Miles Walker in his writings and lectures, and he includes particulars of the designs and tests of various types of modern machines which he has obtained from well-known British manufacturers. The author has himself had practical experience with a commercial firm, and he believes in making the student do things for himself as soon as possible, to which end, after three preliminary chapters dealing with the voltage equation, the magnetic circuit and armature

windings (covering about one-third of the book), he plunges direct into the design of synchronous machines. He then includes sections dealing with induction motors as well as high-speed machines, together with chapters on the operation of a.c. machines of various types.

We have no hesitation in recommending this book to those who are desirous of understanding the theories underlying the design of a.c. machinery.

* * *

Shorter Notices

"Die Elektrizitäts Wirtschaft im Deutschen Reich." (Pp. 360.) Berlin: R. & H. Hoppenstadt. Price RM.32. This is a most complete review of the electric power industry in modern Germany. The areas of the larger concerns are shown by maps which indicate the transmission lines, and full technical details of plant and financial statistics are given.

The 1934 "Tables of Electricity Undertakings" (Benn Bros., 10s.) constitutes the 47th consecutive annual issue, totalling 300 pages, compared with 262 last year. It represents the most complete available record of statistical information relating to electricity supply throughout the world, and all the data has been revised. New features include a complete list of the national grid areas, showing the selected stations and owners, the operating tariffs, and a map of the complete scheme of transmission lines.

"Automatic Street Traffic Signalling," by H. H. Harrison, M.Eng., M.I.E.E., and T. P. Priest. (Pp. 187; figs. 150.) Price 12s. 6d. net. London: Sir Isaac Pitman & Sons, Ltd.

The 1934 edition of "Willing's Press Guide," completely revised, has appeared. No drastic changes have taken place, but a number of fresh publications are included, and the new arrangement in the "towns" and "counties" section separates Northern Ireland from the Irish Free State. There are 502 pages, and the price is 2s. 6d.

"Electrical Engineering Laboratory Experiments," by C. W. Richer and C. E. Tucker. (Pp. 404; figs.) London: McGraw-Hill Publishing Co., Ltd. Price 15s.

"Electric Arc and Oxy-Acetylene Welding," by E. A. Atkins. (Pp. 350; figs. 151.) London: Sir Isaac Pitman & Sons, Ltd. Price: 7s. 6d.

Parliamentary News (BY OUR SPECIAL REPORTER)

THE London Passenger Transport Bill was further considered on May 29th by Mr. Annesley Somerville's Committee of the House of Commons.

Mr. Frank Pick, vice-chairman of the Board, in further evidence, said that examination of the information available showed that in 1932-3 road maintenance cost £102 per car per annum. A 73-seater trolley vehicle would pay £106 16s. vehicle duty and a 56-seater £86 8s. Having regard to the relative capacity of the vehicles there would seem to be no substantial difference in the annual cost to the Board. Trolley vehicles were, however, more advantageous to the local authority than petrol buses because the overhead equipment was rated.

Some discussion arose on Clause 7, which Mr. F. J. Wrottesley, K.C., who appeared for a number of opponents, suggested would enable the Board to go to the Ministry of Transport and obtain permission to run trolley vehicles into any square in Bloomsbury without those affected being in a position to object. Mr. Pick said that there must be intermediate turning places on any trolley route and those would fall to be dealt with under the clause by the Ministry of Transport. He had no doubt that the Ministry would take into consideration any representations made by people who would be affected.

Mr. T. E. Thomas, general manager of the Board's tramways, said that it was proposed to run sixty trolley vehicles an hour during the peak period and not more than forty an hour during the rest of the day and that would not cause congestion of traffic.

The promoters' case was closed and without calling on counsel for the opponents the committee decided to strike out of the Bill the clause authorising the running of trolley vehicles through Bailey Street and the use of Bedford Square as a turning place.

This decision led to some discussion on May 30th as to whether the promoters were now entitled to revert to their original idea of running trolley vehicles in Tottenham Court Road as far as Bedford Avenue. Mr. Tyldesley Jones said the view of the promoters was that it was desirable to get as near as possible to St. Giles's Circus.

Mr. Wrottesley, on behalf of the Duke of Bedford, said there was no time limit in the Bill so that if these powers were given there would be a route with the end left in the air and that might be used by way of prejudice at any time in the event of another application to Parliament. Trolley vehicles were well suited to the outskirts of London but they ought not to be allowed in the crowded area of inner London.

The Chairman said the committee attached much importance to the argument that these vehicles were not suitable for the heart of London. Their decision was that trolley vehicles should be allowed in Tottenham Court Road as far as Francis Street but not south of that point.

A proposal to run trolley vehicles in place of the present tramcars from the Crystal Palace through Croydon to Sutton was considered by the Committee on May 31st. Mr. Tyldesley Jones said the only opposition to the scheme related to the western end. It was proposed to extend the route from the present terminus in Benhill Street for a distance of 550 yards through the Sutton High Street to get a convenient turning point at the junction with Bushey Road. That was opposed by the District Council on the ground that the High Street was too narrow to take these vehicles, but the police raised no objection and the proposal was agreed to by the Traffic Advisory Board.

Mr. S. Turner, K.C., for the District Council, said the Transport Board should provide its own turning place.

Conversion of the existing overhead tramway system from the Crystal Palace through Croydon to Sutton was sanctioned on June 1st. Mr. F. J. Wrottesley, K.C., addressing the committee on behalf of the A.A. and R.A.C., said that in the view of his clients it would create a dangerous situation to turn the trolley vehicles as suggested from the present tram terminus into Sutton High Street. The Board should do as it had done at Uxbridge and acquire land to use as a turning place.

Mr. Tyldesley Jones, K.C., for the Board, said it would be prohibitive if they were not allowed turning places without buying land. The position at Uxbridge was that the Board had a depôt there in which vehicles could be turned.

The Chairman said that the Committee had inspected the whole route and their conclusion was that the balance of advantage lay in sanctioning the route. They thought, however, that only the smallest type of trolley vehicle should be used. Mr. Wrottesley asked that that provision should be put in the Bill. Mr. Tyldesley Jones said that was unnecessary. The Board as a responsible body would have regard to the view of the committee, and, moreover, the Ministry of Transport already had control over the type of vehicle used.

On Tuesday last a clause empowering the Board to convert the Aldgate and Grove Road, Bow, tramway from conduit to the overhead system was considered. Mr. J. H. Thorpe said that the conduit system led to frequent inconvenience, while Mr. T. E. Thomas described the system as an expensive experiment which caused accidents and delays. It would not be worth while, however, dealing with the matter in areas in which trolley buses were likely to replace the tramways. That was not the case with the district in question.

Mr. J. Abady, opposing the Bill for the Stepney Borough Council, said that the proposal would involve a tangle of overhead wires which would spoil the fine appearance of Mile End Road.

The Committee approved the clause.

Arc Lamp Carbons

On June 4th, during the committee stage of the Finance Bill, Mr. D. R. Grenfell moved that, in the case of arc lamp carbons exceeding 14 mm. in diameter, the import duty should be 1s. 6d. per lb. instead of 5s., as provided in the Bill. He said that these carbons were being used in an increasing range of industries in this country, and hundreds of millions were imported every year.

Sir Percy Harris, who supported the amendment, said that the duty amounted almost to a prohibition. He understood that the defence departments were getting all the carbons they wanted in this country, but the big cinemas which insisted on having a carbon which did not cause flicker were dependent on Continental supplies. He was also informed that hospitals using carbons for the treatment of patients could not obtain satisfactory results without drawing on Continental supplies. It was not a matter of price, for the Continental carbon was dearer than the English, but it was more scientifically made, more satisfactory and burned longer.

Mr. Herbert Williams supported the duty, which, he said, was supported by the cinema industry.

Dr. Burgin, Parliamentary Secretary to the Board of Trade, replying for the Government, said that the greater part of the carbons consumed in this country were of less than 14 mm. diameter. No representations in opposition to the duty had been made by any hospital and no fresh considerations of any kind had been put before the Board of Trade since the subject was before the House on April 26th. Fully 85 per cent. of the carbons were consumed by the cinema industry, ten per cent. approximately in photography and process engraving, and only five per cent. by the hospitals, for street lighting and for other purposes. The total retail value of the trade was about £300,000. The Government had been assured that the output capacity of British manufacturers was equal to supplying the whole of the requirements of the country; and definite undertakings had been given that the price of British carbons would not be increased. So far as the cinema industry was concerned there was an undertaking that the price would be actually reduced.

The amendment was negatived by 243 votes to 45.

Later, in reply to Mr. H. Johnstone, Dr. Burgin said that with regard to national defence, in an electrical age, when arc lamp carbons were a very important feature, it was, in the view of the Government advisers, very desirable that the supply should not be in the hands of only one firm. The object of the duty was to encourage the manufacture of carbons in this country.

The clause imposing the duty was carried.

Business and Industrial Notes

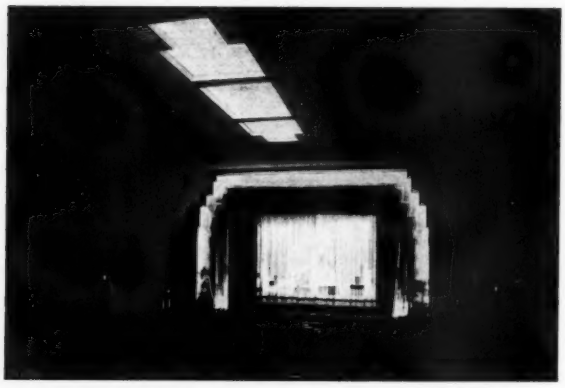
The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

"Tricity" Cookers

In our issue of May 18th, page 721, we recorded the registration of Tricity Cookers, Ltd. We are now informed by the British Electric Transformer Co., Ltd., that it has disposed of its "Tricity" cooker business, which relates to the manufacture and sale of electric cookers and certain other heating and cooking appliances, and that business is now owned by Tricity Cookers, Ltd. The address of the new company is Wellington House, Strand, W.C.

Modern Cinema Lighting

A feature of the "Odeon" Cinema, South Harrow, is its modern lighting in which the predominant colour is green, which produces an inviting atmosphere in the foyer. This is maintained along the passages leading to the auditorium itself. Here the lighting is essentially "warm" in character, the colours shading from a dark crimson to a rose pink. The central feature is a large laylight in the roof supplemented by ceiling fittings and wall brackets of modern design. Practically the entire lighting installation is carried out with specially designed Ediswan fittings. The laylight is composed of decorative glass panels backed by twenty "Mazdalux" reflectors of the dispersive type. These latter ensure even distribution of light over the glass. The lighting scheme was planned



Ediswan lighting fittings in the "Odeon" Cinema

throughout by Ediswan lighting engineers in collaboration with Mr. Swingler, of Cinema Service, Ltd. The Etna Lighting & Heating Co., of Birmingham, were the contractors. The Ediswan Co. also supplied the emergency power plant, a stationary battery composed of 24 cells with a capacity of 90 Ah. at the 10-hour discharge rate.

Harmony in Industry

It is an accepted fact that workpeople engaged on monotonous repetition work amidst the continual noise of machinery cannot always maintain the highest standard of efficiency, and numerous experiments have been made to relieve this monotony. In the workshops of Messrs. J. B. Brooks & Co., Ltd., of Birmingham, music is provided at intervals throughout the day from gramophone records by means of a 10-W undistorted output sound amplifying equipment installed by the British Thomson-Houston Co., Ltd. The results of this interesting experiment have been very satisfactory.

Royal Agricultural Show, Ipswich

The Royal Agricultural Show is to be held at Ipswich this year on July 3rd to the 7th, and a comprehensive electrical exhibition is being arranged. Mr. H. E. Blackiston, chief engineer and manager of the Ipswich electricity undertaking, informs us that the whole of the electricity supply authorities of East Anglia have combined to make a representative show. These comprise the Corporations of Bury St. Edmunds, Colchester, Felixstowe, Great Yarmouth, Harwich, Ipswich, King's Lynn, Lowestoft and Norwich, and the East Anglian Electric Supply Co., Ltd., the East Suffolk Electricity Distribution Co., Ltd., and the Woodbridge and District Electric Light Co. The British Electrical Development Association is also giving its support. A site of over 14,000 sq. ft. has been obtained in a central position of the show ground, upon one side of which a farmhouse is being built which will be completely furnished and equipped entirely electrically, including various lighting fittings, electric fires and examples of tubular and panel heating. It will also include a cooker, bath water heater, refrigerator, wash-boiler, washing machine, &c. A conservatory for showing electric heating and soil heating will adjoin the house. On the opposite side a set of farm buildings is to be erected, comprising cattle sheds, fodder stores, dairy, barn, poultry huts and the usual outbuildings. These, also, will be electrically equipped, including milking machines, portable and fixed motors, food preparing machines, elevators, dairy plant, incubators, brooders, and egg testers. At the south end of the site an exhibition building 60 ft. by 40 ft., lent by E.D.A., will be erected. The centre part of this will be furnished and used as a lounge and inquiry bureau, and each of the subscribing corporations and companies will be represented. Around this central part will be ranged stands devoted to the various sections of the electrical industry. At one end of the exhibition building will be the E.D.A. information bureau, and a large area at the opposite end will be used for the display of farm, agricultural and horticultural implements. The remaining part of the site will contain a general display of apparatus for the use of electricity in the farm, on the land or in the house which cannot be included in the other sections of the exhibition. Many manufacturers are supporting the exhibition.

New Electricity Showrooms

New showrooms and a demonstration kitchen have been built at Pontypool, Mon, for the South Wales Electric Power Co., and on May 31st the premises were officially opened by Mrs. Nellie Gower, J.P. Mr. C. T. Allan (assistant manager of the company) suggested that a branch of the Electrical Association for Women should be formed at Pontypool.

New showrooms for the Electricity Department have been opened at Blackwood by Bedwellty Urban District Council.

A Brook Celebration

To mark the production of their 100,000th motor, and their completion of thirty years as a firm, Messrs. Brook Motors, Ltd., of Huddersfield, closed their works and offices for the day on Saturday last, and an excursion by coach was made by the employés and their friends, numbering about 450, to Scarborough. Two meals were served at the Grand Hotel Restaurant, and during the luncheon a bouquet was presented to Mrs. Brook by the employés. Mr. Ernest Brook stated that they had with them two of the first employés who were engaged by him over thirty years ago, and in addition they had with them Mr. A. Stocks, the chief electrician, who commenced in May, 1905, and Mr. W. Mills, who commenced in June, 1906, both of whom were now directors. Instead of being short of trade they seemed to have an abundance, and he attributed this to the splendid way in which all the employés pulled together. He mentioned that over 20,000 different h.p., speeds and types of motors were made at the Empress Works.

Electrical Contracting at Stoke-on-Trent

At a recent meeting of the Stoke-on-Trent Electricity Committee a resolution from the local E.D.A. Circle was submitted stating that in view of the bad workmanship on assisted-wiring schemes carried out by inexperienced persons it was desirable that all electrical work on such schemes should be entrusted to qualified contractors only. The Committee decided to inform the Circle that it was in sympathy with the views expressed in the resolution, and that in future the engineer would be instructed to accept applications and agreements for assisted-wiring schemes only from contractors whom he considered to be fully qualified to undertake the work, and that when work in connection with existing applications and orders in respect of assisted-wiring schemes had been completed, no applications or agreements would be accepted from canvassers or representatives of firms whose business premises were outside the city.

Danish Electrical Imports

A recently issued D.O.T. report shows that 844 dynamos and electric motors worth 2,495,000 Kr. were imported into Denmark during 1933. About 250 units, valued at 827,000 Kr., were bought from Germany, 172 (736,000 Kr.) from Great Britain, 309 (487,000 Kr.) from Sweden, 32 (214,000 Kr.) from the United States, and 67 (166,000 Kr.) from Switzerland.

Recent Contracts

Among the orders recently received by Messrs. Blackstone and Co., Ltd., for their "unchokeable" pumps and pumping plant are nine 2-in. engine-driven pumps for a Government Department and six 3-in. "Fullway" automatic pumps for the sewage and sludge plant at Northfleet.

The Harland Engineering Co., Ltd., reports considerable activity caused by the number of borehole pumps ordered for drawing upon underground water supplies. The largest of these in hand is for Brighton, comprising two sets each of 4,166 g.p.m. at 455 ft. head driven by 780-h.p. motors. A portable borehole pump for the Metropolitan Water Board for 1,390 g.p.m. at 145 ft. head is an interesting order as two 5-ton trailers are provided for housing and transporting the equipment which is driven by a mobile power house. Orders for standard motors and generators continue to be received, a point of interest being the considerable amount of work being done in connection with the change of frequency on the North-East Coast. Overseas business is well maintained and in-

cludes two pumping sets each for 834 g.p.m. at 2,030 ft. head driven by 1,000-h.p. motors, for South Africa.

The Royal Mail Line's South American service passenger liner *Asturias* is now at Belfast at the yard of Messrs. Harland & Wolff undergoing a complete re-conditioning and refit. The English Electric Co., Ltd., is supplying a certain amount of the electrical generating equipment to the ship as a result of this refit, and this comprises in the case of the *Asturias* and of her sister ship, the *Alcantara*, a 400-kW turbo-generator set. The turbine, which is of the impulse type, has been constructed in the Rugby works of the English Electric Co., whilst the d.c. generator, which is a compound-wound unit, has been built at Stafford. Among other important marine work now being carried out by the company is the power plant for a Diesel-electric barge-handling tug for work on the Thames.

For the illuminations along the sea front at Dover, large quantities of "Beeantee" holders, cable and gaskets were used, So successful were the illuminations carried out at Folkestone last year with the aid of "Beeantee" interchangeable festoon strip lighting that these have recently been extended, involving thousands of holders, connectors, cable, colour sprayed lamps and gaskets, all of which have been supplied by the "Beeantee" Illuminations, Ltd.

The combined electrical display at the Bath and West Show, Oxford

Trade Announcements

The business of Messrs. Appleby & Co. (Engineers), 70, Victoria Street, S.W.1, having recently undergone complete reconstruction owing to the death of the principal, Mr. G. H. Bentley, is adding to its activities modern hoisting machinery of all kinds for contractors' use, railway plant, &c.

The Stearn Electric Co., Ltd., has appointed the Globe Electrical Supplies Co., 19, York Place, Leeds, as its agents for the sale of E.L.M.A. lamps in Yorkshire.

Messrs. Baxter & Caunter, Ltd., have opened a depôt at 14A, Hospital Road, Colchester. Mr. S. Blandford will be in charge of the branch, and Mr. H. W. Hawksworth is the outside representative in that area.

The Cinematograph Trade Exhibition

At the Cinematograph Trade Exhibition, which opens at Blackpool on Monday next, Messrs. Ruston & Hornsby, Ltd., will show two examples of oil engines suitable for installation in cinemas. One will be a five-cylinder vertical oil engine of 88 b.h.p. at 1,000 r.p.m. (Mark 5 VQB). This engine will be shown direct coupled to a Brush generator, making a combined unit of a type installed in a number of cinemas. The other is a single cylinder horizontal oil engine of 17 b.h.p. (Mark 4HRE). This engine is shown coupled to a generator and for driving by "V" ropes.

On the stand of Messrs. Petters, Ltd., will be shown a small atomic Diesel engine installation of 5.5-kW capacity, the engine being of the solid-injection type. The company will also display a set for emergency lighting purposes.

H.M.V. Refrigerators

When H.M.V. Household Appliances, Ltd., introduced its refrigerator at the end of March it was stated that for the first six months the company's activities would be restricted to London and the Home Counties. It has now been decided to extend these activities to the provinces. The company has opened a new showroom at 383/7, Oxford Street, W.1.

Electricity at the Northants Agricultural Show

The great facilities which electricity offers on the farm, in industry, and the domestic sphere are exemplified at the Kettering Electricity Department's stand at the Northants Agricultural Show, which is being held to-day and to-morrow. Electrically heated incubators, hovers and plucking machines are being demonstrated, and a comprehensive range of apparatus indicates that electricity can be cheaply utilised for cake crushing, corn grinding, chaff cutting, water pumping and heating, and, of course, lighting. Many types of electrically driven pumps for water pumping from any depth or from any distance are on view and working. Demonstrations of cooking by electricity are also being given. Other electrical apparatus includes a representative range of refrigerating equipment, including models suitable for farmers and dairymen, and small domestic automatic pumps, both ordinary and pressure tank types.

The Marking of Imported Radio Goods

It is announced that the Standing Committee appointed by the Board of Trade will hold an inquiry on July 16th and 17th as to whether the following descriptions of imported goods should be required to bear an indication of origin:—I. Radio receiving sets, radio gramophones, electrical gramophones, electrical audio frequency amplifiers; whether imported complete or in parts; and II, the following components and accessories for any of the goods included in I: Battery eliminators, chokes, condensers, drives for variable condensers, electrical gramophone pick-ups, volume controls, electrical gramophone motors, gramophone turntable units comprising an electric motor and a turntable, headphones, loud speakers, loud speaker units, resistances, valve holders and adaptors, transformers, tuning coils, resistance-capacity coupling units, choke-capacity coupling units, and chassis or frame carrying, or adapted to carry, a collection of components. The inquiry will be held at the Board of Trade Offices, Great George Street, London, S.W.1. Communication should be addressed to the Secretary, Mr. E. W. Reardon, at that address.

The Transport of Large Machinery

In our last issue we referred to the elaborate arrangements which were necessary to transport a large rotor manufactured at the Stafford works of the English Electric Co., Ltd., for the Tongland power station of the Galloway Power Co., and we now reproduce a photograph showing the rotor loaded on the special rail truck. The rotor represents one of the initial deliveries for the complete Galloway water power scheme, for which the English Electric Co., Ltd., is supplying the turbine plant aggregating 102,000 kW. The total weight of the complete rotor, including poles and shaft, is 64 tons.

A large hydro-electric rotor at the English Electric works ready for transport to Scotland

An Exhibition Train in Victoria

In connection with the forthcoming Victorian Centenary Celebrations, the Australian Association of British Manufacturers is organising, through its head office in Melbourne, a British trade exhibition train, which will visit thirty-six Victorian country towns, covering approximately 1,400 miles, during the nine weeks of the Celebrations from October to Decem-

ber next. The Centenary Council promises official recognition, and approximately one-third of the train space has already been booked. A charge for admission to the train will be made, from which a substantial revenue is anticipated; and the net profit after payment of all expenses will be returned to exhibitors *pro rata*. Particulars are available from the London office of the Association at Australia House, Strand, W.C.

Electrical Manufacturing in Shanghai

The *Chinese Economic Bulletin* reports that the Shanghai Bureau of Social Affairs has completed an extensive investigation of the Chinese and foreign factories situated within the limits of the Municipality. This shows that there are 111 factories of electrical equipment and fittings, with an aggregate capital of $3,044,000 and 4,775 employés.

A Trade-mark Action

In the Chancery Division before Mr. Justice Clauson on May 31st the Crystalate Gramophone Record Manufacturing Co., Ltd., City Rd., London, applied for an injunction to restrain the British Crystalite Co., Ltd., Northumberland Avenue, W.C., from using their name or the word "Crystalite." The plaintiff's case was that ever since 1899 they and their predecessors had advertised and sold large quantities of goods, including electrical apparatus, under the mark "Crystalate," and that the word had become well known to the public as denoting exclusively the plaintiffs' goods.

The defendants pleaded that the names were distinct, and denied that the use by them of the word "Crystalite" could cause any confusion. They alleged that they dealt entirely in electric crystal lamps, while the plaintiffs made insulating material.

After hearing the evidence, his Lordship came to the conclusion that there was such similarity between the two names as in the ordinary circumstances of trade might lead to embarrassment and confusion. He accordingly granted the plaintiffs the injunction as asked but suspended its operation for two months to enable the defendants to take the case further if they so desired.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price, June 6th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£4 18s.	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£206	£2 dec.
Grade II ... ... ,,	£141	£1 dec.
Grade III ... ... ,,	£97	£1 dec.
c Brass (rolled metal 2" to 12" basis) ... per lb.	7d.	—
c ,, Tubes (solid drawn) ... ... ,,	9d. to 9¼d.	—
c ,, Wire, basis ... ... ,,	7¼d.	—
c Copper Tubes (solid drawn)... ... ,,	10d.	—
g ,, Bars (best selected)... ... per ton	£62	—
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£35 15s.	—
g ,, ,, Sheets ... ,,	£35 12/6 to £35 15s.	2s. 6d. inc.
d ,, ,, Wire Rods ... ,,	£42 10s.	—
d ,, ,, H.C. Wire ... per lb.	7¼d.	—
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	5½d.	½d. dec.
i Iron, Pig (Cleveland No. 3)... ... per ton	62/6	—
i ,, Wire galv. No. 1, P.O. qual. ... ,,	£20	—
g Lead, English Pig ... ... ,,	£12 10s.	5s. inc.
g Mercury ... ... per bot.	£11 5s. to £11 7s. 6d.	7/6 to 10s. inc.
c Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	11d.	—
p ,, ,, rolled strip & sheet ,,	11d.	—
p ,, ,, wire ... ... ,,	1/-	—
o Platinum ... ... per oz.	£7 15s.	—
d Silicium Bronze Wire ... ... per lb.	8 ⅛d.	—
r Steel, magnet, in bars ... ... ,,	7½d.	—
n Tin, Block (English) ... ... per ton	£228 to £230	£5 5s. dec.
g ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
Indian-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
r W. R. Dennis & Co.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notes" under the same heading.

A Vacuum Cleaner Campaign

A competition has been organised by British Electric Domestic Appliances, Ltd., open to authorised dealers and their assistants, and wholesalers and their staffs, in which prizes of £3 3s., £2 2s., and £1 1s. are offered in each section for the best suggestions received for the furtherance of trade sales of electric vacuum cleaners.

New "Pifco" Premises

The foundation stone of the new premises of the Provincial Incandescent Fittings Co., Ltd., at Shudehill, Manchester, was laid on June 5th by proxy for Mrs. J. Webber (who was abroad), by Mr. J. Webber, managing director of the company. The new building will have a frontage of 63 ft., will have five storeys and a basement, and there will be accommodation for over 100 clerks. The company will remove from its present address in High Street, Manchester, as soon as the new buildings are completed.

Wire Works Extensions

The Kniveton Cable Works, Ltd., of Queensway, Ponders End, have taken a new works adjoining their existing factory, to enable them to cope with increased business. It is a new and modernly equipped building (20,000 sq. ft.) with northern light and will be known as Kniveton Works. Wires, cables and flexibles of all kinds suitable for the wireless, motor and electrical trades are being made throughout by the company at Ponders End.

O.L.A. Golf Competition

The golf tournament of the Overhead Lines Association was held on June 2nd at Worcester Golf Club, when a cup presented by Mr. J. H. C. Brooking was won by Mr. G. W. Molle.

Electric and Musical Industries Capital Reduction

On June 6th, Mr. Justice Crossman sanctioned the reduction of the capital of Electric and Musical Industries, Ltd., he having the previous day confirmed the reduction of the capital of the two operating companies, viz., the Gramophone Co., Ltd., and Columbia Graphophone Co., Ltd.

Mr. Cohen, K.C., said it was proposed to reduce the capital of the holding company from £6,266,000 to £3,363,000 by cancelling 10s. per share of the issued 5,805,749 ordinary £1 shares. The capital was composed of 5,806,000 ordinary £1 shares and 460,000 preference £1 shares. The company was formed in 1931, and its losses were due to the depreciation of the assets of the operating companies.

A Canadian Business Guide

The Department of Overseas Trade has issued a memorandum prepared by Mr. F. W. Field, Senior Trade Commissioner in Canada and Newfoundland, for the use of business visitors to Canada.

New Catalogues and Lists

T. Kendall & Sons, Norfolk Ironworks, French Place, Shoreditch, E.1.—Leaflets on steel rule cutters, punching machines, shear cutting machines, &c.

Midland Electric Manufacturing Co., Ltd., Barford Street, Birmingham, 5.—A leaflet on 15-A switches for neon sign control.

Brook Motors, Ltd., Empress Works, Huddersfield.—A table of full load currents of a.c. motors.

Santon, Ltd., Somerton Works, Newport, Mon.—A catalogue of water-heaters, giving reduced prices.

W. Jones & Co., 36, Newlands Park, Sydenham, S.E.26.—A pamphlet on ringing machines and induction tone generators.

Petters, Ltd., Westland Works, Yeovil.—Catalogues of universal "M" type oil engines and 1½ to 10 b.h.p. engines.

Measurement, Ltd., Terminal Road, Lower Belgrave Street, Victoria, S.W.1.—A catalogue of meters.

Elliott Brothers (London), Ltd., Century Works, Lewisham.—A booklet on the "Siemens" optical and total radiation pyrometers.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Leaflets on rotary sensitive relays, directional relays, and various switchboard instruments.

Sturtevant Engineering Co., Ltd., 147, Queen Victoria Street, E.C.4.—A catalogue of "Monogram" fans.

Marconi's Wireless Telegraph Co., Ltd., Electra House, Victoria Embankment, W.C.4.—A booklet on portable precision frequency meters.

Donovan Electrical Co., Ltd., 46, Great Charles Street, Birmingham, 3.—A 102-page catalogue of electrical appliances.

Drayton Regulator & Instrument Co., Ltd., West Drayton.—A leaflet describing the "Humidostat" for humidity control.

Venner Time Switches, Ltd., Kingston By-pass Road, New Malden, Surrey.—Particulars of an a.c. prepayment meter.

Greenwood & Batley, Ltd., Albion Works, Leeds.—A pamphlet dealing with the "Greenbat" tiering and stacking truck.

Bankruptcy Proceedings

T. F. Jarrett, trading as T. F. Jarrett & Co., 14, Springcopse Road, and 63, High Street, Reigate, electrical engineer.—The public examination herein took place at the County Court, Scarbrook Road, Croydon, recently. Debtor had returned a statement of affairs which disclosed gross liabilities of £3,714, of which £2,870 was expected to rank for dividend, and there was an estimated deficiency of £2,474. Debtor said that in 1928 he commenced trading in partnership with his brother, who carried on an electrical engineering business in High Street, Reigate. He borrowed £500 and took a quarter share in the business. In January, 1932, he arranged to take over the business, with the liabilities and assets. The trading was not successful, and in March, 1932, he had to borrow £500 to pay pressing creditors. He was subsequently sued for debt, and upon execution being levied, he filed his petition. He attributed his failure to general trade depression, lack of

capital, and inability to obtain full discounts. The examination was adjourned for closing.

M. Chesler, 186, St. Paul's Road, Balsall Heath, Birmingham. wireless and electrical dealer.—This debtor's public examination was held at the Court House, Birmingham, on May 30th. According to the statement of affairs lodged there were ranking liabilities of £1,203, with assets of £381, leaving a deficiency of £822. Debtor said that most of his business was conducted on hire-purchase terms. He agreed that to a certain degree his failure had been caused by taking over too many premises; he owed £728 to finance companies. He attributed his failure to loss incurred by customers defaulting under hire-purchase agreements, competition, heavy expenses in servicing sets, and depreciation of effects. The examination was adjourned for the signing of the notes.

R. Phœnix, 28, Tramway Street, Leeds, trading as the Monarch Radio Service.—The public examination herein was held on May 29th, at the County Court House, Leeds, when the statement of affairs showed gross liabilities of £538, of which £343 was expected to rank for dividend, and an estimated deficiency of £295. Debtor estimated that he lost about £30 when his workshop was broken into early this year. The position was also attributed to bad trade and lack of capital. The examination was adjourned for formal closing.

R. B. M. Emerson, 330, London Road, Westcliff-on-Sea, electrical engineer.—This debtor filed his own petition recently, and has returned a statement of affairs which shows gross liabilities of £1,661, of which £953 is expected to rank for dividend, and net assets valued at £679, leaving a deficiency of £274. He states that he realised his position in September, 1933, and attributes his failure to general trade depression, profits from business being insufficient to cover overhead expenses and personal drawings, depreciation in value of shares in a limited company, and depreciation of house property.

G. F. Richards, 1, Peel Street, Kidderminster, wireless and electrical dealer.—Living beyond the profits of the business, illness expenses, and granting credit to customers beyond his capital, was the explanation given by this debtor when he appeared for his public examination recently at the Town Hall, Kidderminster. The statement of affairs disclosed liabilities of £192, and assets of £107. The examination was closed.

H. Barker, trading as the Broadway Radio Stores, 848, Manchester Road, Bradford, radio dealer.—A deficiency of £307 was disclosed at the first meeting of creditors held in this matter at the Official Receiver's Office, 71, Manningham Lane, Bradford, on May 29th. The case being a summary one was left in the hands of the Official Receiver, as trustee.

D. J. Watkins (Watkins & Son), wireless and electrical engineer, 72, Victoria Road, Surbiton.—Receiving order made May 24th on debtor's own petition.

A. J. Barks and **H. Barks** (Barks Bros.), electrical and radio engineers, 10, St. Martin's Lane, Lincoln.—Receiving order made May 24th on debtor's own petition. First meeting June 8th at 1, St. Swithin's Square, Lincoln. Public examination June 14th at the Sessions House, Lincoln.

A. J. Harding, electrical engineer, 50-51, Broad Street, Hereford.—Public examination June 25th at the Shirehall, Hereford.

C. H. Dye (Radio Electrical Service), electrical engineer, 3, St. Augustine's Street, Norwich.—Public examination, June 12th, at the Shirehall, Norwich.

A. E. Zoumer (Movitone Radio Co.), radio dealer, 660A, Holloway Road, N.—Application for discharge to be heard on June 22nd at Bankruptcy Buildings, Carey Street, W.C.

P. Kalis (Ludgate Circus Radio), wireless dealer, 4, Ludgate House, Ludgate Circus, E.C.—Discharge suspended for eighteen months until November 3rd, 1935.

L. G. H. Cantle, electrical engineer, Woodberry Cottage, Woodland Grove, Oatlands Park, Weybridge.—Trustee, Mr. H. Lever, 133-9, Finsbury Pavement, E.C.; released April 30th.

A. L. Weekes, electrical engineer, 13, Crescent Road, Luton. —Last day for receiving proofs for dividend June 12th. Trustee, Mr. T. Bengough, 6, The Parade, Northampton, Official Receiver.

W. Rowlands, wireless dealer, 56, High Street, Bethesda.—Trustee, Mr. I. D. Hooson, St. Peter's Churchyard, The Cross, Chester, Official Receiver, released May 11th.

E. V. Russell (Skegness Electric Service), 2, Tennyson Buildings, Drummond Road, Skegness.—Last day for receiving proofs for dividend June 16th. Trustee, Mr. E. C. Midgley, 1, St. Swithin's Square, Lincoln, Official Receiver.

A. S. F. Carpenter, retail radio dealer, Stourvale Radio Stores, Christchurch.—Last day for receiving proofs for dividend June 19th. Trustee, Mr. C. J. Pyke, Midland Bank Chambers, High Street, Southampton, Official Receiver.

Company Liquidations

S. A. Lamplugh, Ltd.—Meetings July 9th at 10, Newdegate Street, Nuneaton, to receive an account of the winding-up by the liquidator, Mr. P. Russell.

Essex Auto Manufacturing Co., Ltd.—Meetings July 9th at 1 and 2, Weston Chambers, Weston Road, Southend-on-Sea, to receive an account of the winding-up by the liquidator, Mr. R. J. Rayner.

Simpsons Electricals, Ltd.—Meeting July 2nd at Langham Hotel, Portland Place, W., to receive an account of the winding-up by the liquidator, Mr. A. Hastings.

Private Arrangement

J. R. Durber, trading as "Durber Bros.," 12, Red Lion Square, Newcastle-under-Lyme, and as "City Electrical Supplies," 183, London Road, Stoke, electrical engineer.—A meeting of creditors was held recently, when a statement of affairs prepared by Messrs. Poppleton & Appleby, Birmingham, was submitted, showing liabilities of £479 and net assets of £185, leaving a deficiency of £294. No resolution was passed at the meeting, the principal creditor saying that the estate should be dealt with in bankruptcy.

Dissolution of Partnership

Gilbert & Stamper, electricians, 34, Quarry Hill Road, Tonbridge.—Messrs. R. A. R. Stamper and W. G. Gilbert have dissolved partnership. Mr. Stamper will attend to debts and carry on the business.

Electricity Supply

Lighting, Domestic, Power

Australia.—BARRON FALLS EXTENSION.—The Barron Falls Hydro-Electric Board (Q) has decided to apply for a loan of £20,430 from the Commonwealth Bank to complete an underground power station at the Falls. This is in addition to the £100,000 being spent on the scheme which is expected to be completed about the end of this year.

Barking.—NEW EQUIPMENT.—The Electricity Committee has authorised the purchase of meter test-room equipment at an estimated cost of £778, and tenders are to be invited.

Beckenham.—EXTENSIONS.—The Urban District Council is to carry out extensions to the e.h.p. feeders, with protective switchgear, at twenty sub-stations, &c., at an estimated cost of £8,942, for which sum a loan is to be sought.

Berwickshire.—ELECTRICITY EXTENSIONS.—Mr. W. S. Sautell, the general manager of the Scottish Southern Electric Supply Co., has had interviews with the Councils at Eyemouth and Duns with a view to supplying both places with power. In each case a committee has been formed to go into the matter.

Birkenhead.—LOAN.—Notice of motion has been given to the Town Council for standing orders to be suspended to allow consideration by the Council of a resolution of the Electricity Committee passed on May 14th, 1934, relating to an application for sanction to borrow £8,526 for sub-station equipment.

Blackburn.—A YEAR'S PROGRESS.—Notwithstanding a loss of £10,000, due to the removal of the post-war increase of 10 per cent. in electricity charges, Mr. W. A. Royle, the borough electrical engineer, reports a record year in his annual returns. The net trading profit was £14,538, and after providing for certain capital charges there was a disposable balance of £9,566, sufficient to clear the outstanding deficiency and leave £1,673 in hand. The amount of electricity sold was 30,170,947 kWh, against 26,643,181 kWh for the previous year. Sales for heating and cooking increased by 13 per cent., and power by 17 per cent., while sales on the domestic rate showed a rise of 14 per cent. The Department has now 19,897 consumers, 2,445 new connections having been made during the year. Those connected under the assisted-wiring scheme number 2,310.

Unusual height and design characterise some new concrete lamp posts recently erected in Liverpool, an example of which is illustrated.

Bridlington.—LOAN.—The Town Council has received consent to a loan of £5,700 for mains and services.

Canada.—OUTPUT DURING APRIL.—The total output of central electric stations in Canada for the month of April was 1,696,646,000 kWh, a decrease of 99,243,000 from the March output but an increase of nearly 400,000,000 kWh over the April, 1933, production of 1,296,805,000 kWh. Exports totalled 63,099,000 kWh, as compared with 112,114,000 in March and 35,720,000 in April of last year.

Cove.—SUPPLY SOON.—The Clyde Valley Power Co. has decided to proceed with the carrying of a supply of electricity into Cove and Kilcreggan, and the work of laying the cable will be commenced after final arrangements have been made.

Coventry.—NEW EQUIPMENT.—The Electricity Committee is seeking sanction to borrow £86,590 for new transmission cables and other equipment.

Durham.—ELECTRICITY IN SCHOOLS.—The County Education Committee has received sanction from the Board of Education to electrical installations at the following Council schools: Emmaville, Greenside, Marley Hill, Wearhead, Spennymoor, and Tudhoe Upper Church Street.

Earby.—REDUCED CHARGES.—A recommendation to reduce the price of electricity for heating and cooking from ¾d. to ½d. per kWh has been approved by the Urban District Council.

LOAN.—The Electricity Commissioners have sanctioned the borrowing of £3,859 for mains, meters and services.

Edinburgh.—REDUCED CHARGES.—The estimates for 1934-35 show a surplus of £30,000, and this sum is to be used for reductions. Consideration has been given to consumers whose consumption for lighting purposes is high in proportion to the wattage of the lamps installed. At present this class of consumer is charged at 1d. per kWh, plus an annual charge

on the basis of £10 for every 1,000 W of installed lighting, and the Public Utilities Committee has decided to reduce the "unit" rate to ¾d. and the annual charge per 1,000 W to £7 10s. The ordinary rate of 3½d. per kWh, with discounts up to 12 per cent., remains unaltered. The Committee has also approved the reduction of the rate of charge for domestic heating from ¾d. per kWh to ½d. The rates for power, which are considered to be very low, have not been reduced, except for consumers who are supplied on the kVA demand basis. It has been decided to make a uniform rate of £3 15s. per kVA per annum in the future, the running charge of 0.24d. per kWh to remain as at present.

Eston (Yorks).—The Electricity Committee has asked the electrical engineer to report on a request from the Teesville tenants for a supply of electricity on the same terms as the tenants of the Grangetown Estate, *i.e.*, payment of a standing charge of 6d. per week, with the addition of 2d. for each kWh consumed.

Faringdon.—PROPOSED EXTENSION.—The Wessex Electricity Co. has informed the Rural District Council that plans for the extensions of the mains from Bishopstone to Ashbury have been provisionally included in next year's budget, but at present no definite decision has been taken.

Fife.—GRAMPIAN SCHEME.—As a part of the Grampian system, arrangements are now practically completed for the electrification of the villages of Carnock, Oakley, and Comrie, in West Fife. It is expected that the work will be finished in about eight weeks' time.

Finchley.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow £5,548 for mains and £5,852 for sub-station equipment.

Glasgow.—INQUIRY WANTED.—A report has been submitted to the Housing Committee dealing with the respective charges made by the Corporation and the Clyde Valley Electrical Power Co. for electricity supplied to domestic consumers residing in the Corporation area. The report showed that for a house of two apartments, with a consumption of 1,500 kWh, the Clyde Valley charge would be £4 17s. 6d., as against the Corporation charge of £3 16s. 11d.; for a three-apartment house, with a consumption of 2,000 kWh, the Clyde Valley charge would be £6 13s. 4d., as against a Corporation charge of £5 2s. 6d., with corresponding differences for larger houses. It was agreed that representations should be made to the Ministry of Transport for a revision of the Clyde Valley charges.

Guildford.—SUPPLY EXTENSION.—The Electricity Committee recommends extending a supply to the Jacobswell district at a cost of £1,805.

Ilford.—REDUCED CHARGE.—The Town Council has reduced the "unit" charge of the domestic rate from ¾d. to ½d.

Jarrow.—DEVELOPMENTS.—The North-Eastern Electric Supply Co., Ltd., is considering the expenditure of £30,000 on electricity distribution at Jarrow.

Jersey.—REDUCED CHARGES.—At the recent annual general meeting of the Jersey Electricity Co., Ltd., the chairman announced that the year had been a successful one and that 800 new consumers had been connected up as compared with 620 in 1932. The Sales and Contract Department added materially to the success of the company, and the following reductions are to be made: Heating and power, from 3½d. to 3d. per kWh; window lighting, 6d. to 4d. per kWh; large power consumers, 2d. The average price of electricity is now 4.01d. instead of 4.75d. as last year. An article on the undertaking appears on page 827.

Leicester.—LOAN.—Application is to be made by the Electricity Committee for sanction to a loan of £150,000 for mains and services during the next three years.

London.—SOUTHWARK.—The Electricity Committee recommends various extensions to be undertaken during the next twelve months at an estimated cost of £18,146.

Middlesbrough.—SUB-STATION.—The Town Council is to erect an electricity sub-station in Northern Road near the Acklam Housing Estate.

Midhurst.—OVERHEAD LINES.—The Rural District Council is to offer no objection to the erection of overhead cables by the Mid-Southern Utility Co. from Buriton to Harting, and thence to Elstead, Twyford, Bepton, and Cocking.

Morecambe.—ILLUMINATIONS.—The Morecambe and Heysham Council is to spend £5,000 on an extended scheme of illuminations during the autumn, an increase of £2,000 on last year.

Newmarket.—SUPPLY EXTENSION.—The Beds, Cambs, and Hunts Electricity Co. has informed the Rural District Council of its intention to continue negotiations with owners and tenants with a view to overcoming difficulties in connection with the proposed supply of electricity to Cheveley, Woodditton, and other places in the vicinity. The company has also applied to the Council for permission to erect an overhead line at Soham, but the Council, objecting to any further overhead lines, has suggested the use of underground mains.

Northern Ireland.—BELFAST.—The Corporation is applying for sanction to alter the electricity supply system of eleven streets in the south city area from d.c. to a.c.

Plymouth.—HIRE OF APPARATUS.—The Electricity Committee has adopted a scheme for the simple hire of cookers and installations. The scheme now in operation provides for the supply of such apparatus on hire-purchase terms, under which the cooker becomes the property of the consumer after twelve quarterly payments. Under the hire-purchase scheme the hirer is offered a range of sizes, makes and classes of finish from which a selection can be made. For a simple hire scheme the number of sizes and class should be restricted in order to minimise the necessary stocks of cookers and spare parts and to simplify and cheapen maintenance. The following scale was submitted for consideration: Cooker for 2-5 persons, hire (no wiring) 8s. 4d., with wiring (limit 50 yds.) 10s. 7d. per quarter; 3-5 persons, hire (no wiring) 9s. 3d., with wiring (limit 50 yds.) 11s. 9d. per quarter; and 4-6 persons, hire (no wiring) 11s. 3d., with wiring (limit 50 yds.) 14s. 3d. per quarter. Each hiring should be subject to the condition that the hiring shall be for a period of not less than one year. The recommendations were adopted.

Portsmouth.—SUPPLY EXTENSIONS.—It is proposed to extend mains to the Council houses at North Boarhunt and Wickham.

Rawtenstall.—REDUCED CHARGE.—The Electricity Committee has reduced the price of electricity supplied through slot meters by 0.125d. per kWh.

ELECTRIC STREET LIGHTING.—The remaining gas street lamps are to be converted to electricity during the summer.

Roxburgh.—OVERHEAD LINES.—The County Council is raising no objections to proposals of the Scottish Southern Electric Supply Co., Ltd., to erect a l.p. distribution network over an extensive area.

Scarborough.—UNDERTAKING REFUSES AN OFFER.—The Town Council has refused an offer for the purchase of the electricity undertaking, which would have left a clear profit of £75,000 after meeting a capital outlay of over £500,000.

Scotland.—SPECIAL ORDER.—Notice is given that application is intended to be made to the Electricity Commissioners by Mr. G. A. Bruce, of Great Yarmouth, for a Special Order to authorise him, or a company to be registered, to generate, supply, transform, and distribute electricity for all public and private purposes within the burghs of Campbeltown and Lochgilphead and the parishes of Glassary, Kilmartin, North Knapdale, and South Knapdale.

Sedbergh (Yorks).—FIRE DESTROYS PLANT.—A fire which broke out in a wood-yard last Saturday destroyed the electricity station of the telephone exchange and did, altogether, about £7,000 worth of damage. The power station is owned by the Sedbergh Electrical Company & Cabinet Works.

Sheffield.—MAINS EXTENSIONS.—The Electricity Committee has approved the expenditure of £9,555 on the extension of mains, and the Electricity Commissioners have sanctioned the borrowing of £13,603 for a similar purpose.

Stoke-on-Trent.—SUPPLY EXTENSION.—The Electricity Committee has decided to give a supply, at a cost of £7,000, to 558 houses to be erected by Messrs. J. W. Thornley & Sons at Stanfield, Burslem.

LOANS.—The Electricity Committee has obtained sanction to borrow £1,750 for mains and sub-station equipment at Newcastle Street, Burslem; £1,500 for mains to supply Lily Street and Ellison Street, Wolstanton; £3,600 for an additional feeder from the generating station to Empson Street sub-station; £2,339 for the equipment of Gortons Cottages sub-station; £5,000 balance for change-over of supply; and £476 for sub-station building at Goldenhill.

CHANGE-OVER.—The Electricity Committee is to change over a further section of the Longton area at a cost of £7,350.

Tredegar (Mon).—ELECTRICITY SCHEME.—The Council has decided to provide an electricity scheme for the town, and is now in consultation with the Electricity Commissioners. The Commissioners have stated, however, that they are not prepared at the present time to sanction the borrowing of £1,500 for the provision of consumers' wiring installations, motors, and apparatus, but that they are willing that their representative should discuss the matter with the Council.

Uppingham.—EXTENSION.—The Mid-Lincolnshire Electric Supply Co., Ltd., has informed the Rural District Council of its intention to erect a cable from Uppingham, Lyddington, and Thorpe Bywater to Gretton, Caldecott, and Rockingham.

Uttoxeter.—REDUCED CHARGES.—The Urban District Council has reduced the charge for electricity for power from 2d. to 1½d. per kWh in the town area and from 2½d. to 2d. in the rural area.

Wimbledon.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow £12,990 for kiosks and sub-station equipment.

Winchester.—OVERHEAD LINES.—The Rural District Council has approved overhead l.p. mains at King's Worthy to be erected by the Mid-Southern Utility Co.

Wolverhampton.—SUPPLY TO TRESCOTT.—The Electricity Committee is to provide a supply to the village of Trescott, at a cost of £1,132, and to extend mains at a cost of £1,178.

York.—LOAN.—The Electricity Committee has obtained sanction to borrow £33,000 for mains and £1,000 for meters, and is seeking sanction to borrow £8,000 for apparatus to be let out on hire and £7,500 for transformers and sub-station equipment.

Traction

Belgium.—RAILWAY ELECTRIFICATION.—Addressing the shareholders at the annual meeting of the Société Nationale des Chemins de Fer Vicinaux on May 29th, the chairman is reported to have stated that 86 km. of line were electrified during 1933, thus bringing the total up to 1,227 km. The electrical sections alone yielded 64 per cent. of the total receipts, although the length of these lines is only slightly more than one-fourth of the aggregate network. Such success must encourage the company to extend electrical working to the lines where the volume of the traffic is sufficient or may become sufficient.

Blackburn.—BUSES REPLACE TRAMS.—A licence for the running of buses on the Audley section, Blackburn, to replace trams has been granted by the Traffic Commissioners.

Germany.—NEW ELECTRIC VEHICLE.—The Hansa Lloyd Co., of Bremen, has taken up the construction of electric commercial vehicles, including a 5-ton six-wheel truck. The electric motor, which drives the first of the two rear axles through a propeller shaft and worm gearing, is supplied with energy from a 300-Ah 80-cell battery divided into two sections. The controller is adapted to give four forward and two reverse speeds, and can maintain a speed of about 15½ m.p.h.

Huddersfield.—NEWEST TROLLEY-BUS.—One of the latest vehicles to be put into service by the Corporation tramways is an A.E.C.-English Electric 6-wheeled, 60-seater trolley-bus. The motor and electrical equipment follow the lines of other trolley-buses conjointly manufactured by the two companies. In the case of the six-wheeler, a third differential mounted on ball and roller bearings in the forward axle at the rear end of the worm shaft is incorporated, as also is a torque blade made from chrome vanadium spring steel and carried in robust central-mounted cast brackets on each of the axle casings. This trolley-bus is arranged to seat twenty-eight passengers in the lower and thirty-two passengers in the upper saloon. For both saloons mahogany moulding has been used, and for the interior panels scratchproof maroon rexine has been adopted. The vehicle is well ventilated, and for lighting six circuits are provided, which consist of five 110-V, 40-W gasfilled lamps. The switch and fuse board are mounted on the bulkhead in the driver's cab, and two inner lamps with a warning buzzer will be fitted so that indication may be given if the trolley pole should leave the wire. It has been arranged for six neon lamps to illuminate the air-brake gauges at night.

The new Huddersfield trolley-bus

Northern Ireland.—BELFAST.—The report of the Belfast Corporation tramway undertaking for the year ended March 31st, 1934, shows a surplus of £63,038. The total number of passengers carried was 107,460,305, an increase of 2,223,025 on last year's figure. Traffic revenue amounted to £552,163, as compared with £540,676 for the previous year; working expenses at £367,365 showed an increase of £7,423, due to the greater mileage run; and the average cost per mile was 9.81d., a decrease of 0.02d. on the figure for the previous year.

South Shields.—TROLLEY-BUSES.—Mr. E. R. L. Fitzpayne, the new tramway manager, has prepared a scheme for the introduction of trolley-buses between Shields and Marsden at a cost of £14,500. This will be made up as follows: Laygate to the borough boundary in Prince Edward Road, £4,100; borough boundary to Marsden, £2,000; six single-deck trolley-buses, £8,400. Mr. Fitzpayne recommends the Town Council not to proceed with a scheme for extending the tram track in Prince Edward Road to the borough boundary, which, he states, would cost £55,000, but suggests the introduction of a trolley-bus service instead. The Town Clerk states that it will be necessary for the Council to promote a Bill in Parliament for this purpose.

Sunderland.—TRAMWAY EXTENSION.—The Town Council intends to extend the tramway service from Newcastle Road to Seaburn, Whitburn, and to the Ford and Grindon Estates. Application is being made to the Ministry of Transport for the necessary sanction.

United States.—NEW SUBWAY CAR.—A new aluminium subway car has been introduced on the Brooklyn Manhattan Transit Co., says *Reuter's Trade Service* (New York). Photo-electric cells control the indirect lighting, and the motorman exercises complete control over signs, lights, doors and ventilating equipment. The car is 170 ft. long, weighs 167,800 lb., and has a maximum speed of 54 m.p.h.

Communications

Canada.—CABLE LINK WITH BRITAIN.—A direct cable service between London and Toronto was inaugurated on June 1st by the Western Union Cable Co. in conjunction with the Canadian National Telegraphs.

Europe.—AIRCRAFT WIRELESS.—The International Air Navigation Committee at Lisbon has decided that every aeroplane carrying a weight of over 2,000 kg. must be fitted with radio apparatus.

Great Britain.—NEW RELAY STATION.—It is reported that representatives of the B.B.C.'s engineering department are staying at Bangor with a view to making tests as to the suitability of Bangor as the site for a relay station.

RADIO RELAY SERVICES.—The Lord Provost's Committee of Edinburgh Corporation has recommended that permission be given for an experiment in radio relaying in an area of the city.

The Wrexham Highways Committee is discussing the possibility of installing a radio relay service at Wrexham.

Hull.—MUNICIPAL TELEPHONE PROGRESS.—The municipal telephone undertaking, the only one of its kind in the country, has had another prosperous year, a surplus of £29,206 being reported by the borough treasurer. Capital outlay amounted to £46,448, of which £13,328 was met out of revenue and £12,195 was paid in royalties to the Post Office.

India.—SHORT-WAVE BROADCASTING.—The State Broadcasting Service, with the sanction of the Government of India, is carrying out in Bombay this week tests with an ultra-short-wave transmitter.

Italy.—TOKIO-ROME RADIO INAUGURATED.—A *Reuter* message from Tokio says that the wireless service between Tokio and Rome was inaugurated on June 1st by congratulatory messages between the Japanese and Italian Governments.

London.—A BROADCASTING CONFERENCE.—The Union Internationale de Radiodiffusion will meet in London from June 12th to 20th, under the presidency of Vice-Admiral Sir Charles D. Carpendale, C.B., Administrative Controller of the B.B.C. At the inaugural meeting on June 12th the delegates will be welcomed by the Right Hon. J. H. Whitley, chairman of the Board of Governors, B.B.C. The plans for the meeting—which is the first to be held in London since the Union was founded in 1925, in the board room at Savoy Hill, by a conference of broadcasting organisations assembled at the instance of the old British Broadcasting Company—allow for sixty hours of discussion, excluding the time to be given to visits of an instructive nature, such as to the International Trunk Exchange of the General Post Office, to Broadcasting House, where a special demonstration will be given of the British method of producing radio drama, to the new long-wave high-power station now in course of construction at Droitwich, and to the Tower of London during a relay of the Ceremony of the Keys.

South Africa.—NEW RAND CABLE.—The Telephone Department is spending £62,000 on a new cable to link up all the towns on the East Rand with Johannesburg. The order for the cable has been placed in England.

Switzerland.—BROADCAST WAVELENGTHS.—The wavelength conventions which were formulated at the Madrid and Lucerne conferences were adopted by the Council of State on June 4th.

Capt. P. P. Eckersley demonstrating electric mains radio rediffusion at the I.M.E.A. Convention last week

WIRELESS LICENCES.—At the end of March last a total of 312,000 radio receiving licences were in operation in Switzerland, which is an increase of about 12,000 licences since the end of 1933.

United States.—REGULATING COMMUNICATIONS.—The House of Representatives has passed the Rayburn Bill providing for the setting up of a Federal Commission to regulate communications, says *Reuter* (Washington).

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—July 24th. Posts and Telegraphs Department. Enamelled insulated braided switchboard cable. (A.Y. 12396.)*

June 26th. Rectifier and motor generators. (A.Y. 12409.)*

Barking.—June 12th. Electricity Department. Three 250-kVA and two 400-kVA transformers, one 230-kW glass bulb rectifier, and one 500-kW glass bulb or steel tank rectifier. (May 25th.)

Barnes.—June 12th. Electricity Department. Glass-bulb mercury vapour rectifier plant. (May 11th.)

Belfast.—June 11th. Electricity Department. 33-kV cables (underground and submarine) with overhead switching equipment. (June 1st.)

Blackpool.—June 13th. Corporation. Electrically driven centrifugal pumps of non-choking type for pumping screened sewage, with starters for hand or automatic float operation. Specifications from Borough Surveyor.

Bristol.—June 30th. Electricity Department. CO_2 fire protective equipment. (May 25th.)

Bromley.—June 11th. Electricity Department. L.P., 660-V, e.h.p. and pilot cable. (June 1st.)

Carlisle.—June 8th. Electricity Department. Transformers. (May 18th.)

City Council. Five axial flow pumps with electric motors and equipment. Particulars from P. Dalton, city engineer, 18, Fisher Street.

Cheadle & Gatley.—June 18th. Electricity Department. Extensions to existing 6.6-kV switchgear and 6.6-kV switchgear for the Ramillies Avenue sub-station. (June 1st.)

Clyde.—June 9th. Navigation Trust. Supply of electrical stores. Specifications, &c., from Stores Department, 1, Graving Dock, Govan; tenders to J. Macfarlane, general manager and secretary, 16, Robertson Street, Glasgow.

Conisborough.—June 16th. Electric lighting at Morley Place Council School. Particulars from Education Officer, County Hall, Wakefield; tenders to J. C. McGrath, clerk of the county council, County Hall, Wakefield.

Durham.—June 15th. County Council. One-way light signals at three road crossings. Specifications from W. J. Merrett, county engineer and surveyor, County Surveyor's Office, 43, Old Elvet.

County Public Assistance Committee. Electrically driven laundry plant for use at the Barnard Castle Institution. Particulars from W. J. Merrett, county surveyor, Shire Hall.

Eastbourne.—June 12th. Electricity Department. High-voltage pressure testing equipment. (May 25th.)

East Retford.—June 20th. Electricity Department. Transformers, switchgear, e.h.p., and l.p. cables. (See this issue.)

Edinburgh.—June 8th. Corporation. Electrical installations at Darroch Royal High Secondary and James Gillespie's Schools. Schedules from City Architect; tenders to Town Clerk.

Egypt.—CAIRO.—July 12th. Ministry of the Interior. Material required for the extension of the electrical network at Mehalla el Kobra. (A.Y. 12361.)*

July 17th. Electrical equipment for the supply of power to Chebin-el-Kanater. (A.Y. 12407.)*

June 27th. Ministry of Public Works. Electrically driven machine tools and generating set. (A.Y. 12390.)*

Farnborough.—June 20th. U.D.C. Electric syren at the fire station. Particulars from Offices of the Engineer and Surveyor; tenders to J. G. Kingdon, clerk to the council, Town Hall.

Folkestone.—Corporation. Heating and lighting of the pavilion, East Cliff. (See this issue.)

Gainsborough.—June 8th. Electricity Department. Transformer kiosk, complete with 250-kVA transformer and switchgear. (May 25th.)

Glasgow.—June 21st. Corporation. Electrical work at High School. Specifications, &c., from Education Offices (property department), 129, Bath Street (deposit £1 1s.); tenders to Town Clerk.

Grantown.—June 30th. Town Council. Various works, including electric lighting, at housing scheme. Schedules from T. M. Jaffrey, architect, Grantown-on-Spey (deposit £1); tenders to Town Clerk.

Heston and Isleworth.—June 29th. Electricity Department. 560-V standby battery. (See this issue.)

Hull.—June 25th. City Council. Electric lighting in new garage. Specifications from City Treasurer, Guildhall (£2).

Lancaster.—Electricity Department. Transformers. (June 1st.)

Leeds.—June 16th. Wiring at Menston Mental Hospital. Particulars from W. E. H. Burton, Mental Hospital, Wakefield (deposit £2 2s.).

London.—CENTRAL ELECTRICITY BOARD.—June 28th. 132,000-V transformers and 66,000-V and low-voltage transformers. (May 25th.)

H.M. OFFICE OF WORKS.—June 15th. Electrical accessories. (June 1st.)

METROPOLITAN WATER BOARD.—June 20th. Two electrically driven vertical centrifugal well pumps and two sets of electrically driven horizontal centrifugal high-lift pumps, piping, &c., at the Rye Common pumping station. Specifications from the Chief Engineer, 173, Rosebery Avenue (deposit £2 2s. with the Accountant).

Newport (Mon.).—June 23rd. Electricity Department. Electrically driven circulating water pumps, switchgear and water screening plant. (June 1st.)

New Zealand.—WELLINGTON.—Post and Telegraphs Department. July 3rd. Telephone instrument and switchboard cords. (A.Y. 12363.)*

July 4th. Telephone keys and key-mountings. (A.Y. 12366.)* Metal-cased condensers. (A.Y. 12364.)*

July 24th. 100,000 rubber insulator rings. (F.Y. 2036.)*

Northern Ireland.—DOWNPATRICK.—June 12th. Down County Council. Installation of electric lighting in County Courthouse. Particulars from J. G. Wilkin, Courthouse.

LISBURN.—June 19th. Lisburn and District Hospital Committee. Alterations to district hospital, electrical installation. Particulars from S. J. Crail, clerk, Hospital Offices, Dublin Road.

Nottingham.—June 19th. Electricity Committee. General stores for twelve months. (June 1st.)

June 13th. Education Committee. Electric lighting at Council schools. Particulars from Education Offices, South Parade (deposit £1); tenders to A. H. Whipple, director of education, Education Offices.

Oldham.—June 16th. Lighting installation to dwelling houses. Particulars from Borough Engineer and Surveyor, Town Hall.

Penicuik.—June 16th. Town Council. Various works, including electric lighting, of sixty "flatted" houses. Schedules from Morham and Brotchie, surveyors, 29, Hanover Street, Edinburgh; tenders to Town Clerk.

Shipley.—June 12th. Electricity Department. E.h.p. and l.p. cables. (May 18th.)

South Africa.—JOHANNESBURG.—Municipality. June 21st. H.p. cable. (A.Y. 12386.)* House-service cut-outs. (A.Y. 12389.)*

Thirty-six three-phase oil-immersed circuit breakers. (A.Y. 12404.)*

Stoke-on-Trent.—June 13th. Electrical Engineers' Department. Three-phase motors. (June 1st.)

Tain.—June 26th. Town Council. Various works, including electric lighting, at twenty houses. Schedules from J. H. Hinton Gall & Son, architects, 13, Lombard Street, Inverness; tenders to Town Clerk.

Tamworth.—June 18th. Sewage Disposal Joint Committee. Removal of existing pumping plant and installation of two centrifugal pumps with electric motors and equipment, connecting pipes and incidental works. Specifications from Dodd & Watson, 3, Central Buildings, S.W.1 (£2 2s.).

Totnes.—June 14th. Town Council. Electric motors and centrifugal pumps in connection with water supply works. Particulars from J. W. Smith, borough engineer; tenders to G. E. Windeatt, town clerk.

Uruguay.—MONTEVIDEO.—July 27th. State Electricity Supply and Telephones Administration. Bare copper conductors and telephone lines. (G.Y. 13853.)*

Weymouth & Melcombe Regis.—June 15th. Electricity Department. 11,000-V overhead and underground line and l.p. overhead lines. (May 18th.)

Wolverhampton.—July 2nd. West Midlands Joint Electricity Authority. Two 5,000-kVA, 33/11,000-V transformers, e.h.p. and l.p. cables. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Ardrossan.—Town Council. Accepted. Electric lighting of eighty-four houses at New Parkhouse (£307).—D. Robertson.

Barking.—Electricity Committee. Accepted. Cable (£88).—Standard Telephones & Cables, Ltd. (£923).—Telegraph Construction & Maintenance Co., Ltd.

Birkenhead.—Electricity Committee. Recommended. Switchgear for sub-stations (£7,151).—A. Reyrolle & Co., Ltd.; (£874).—Switchgear & Cowans Co., Ltd.

Cheltenham.—Electricity Committee. Accepted. Overhead line to Birdlip (£2,912).—Johnson & Phillips, Ltd.

Durham.—County Assistance Committee. Recommended. Electric dough mixer for institution (£150).—Hobart Manufacturing Co., Ltd.

Eastbourne.—Electricity Committee. Recommended. Electric cookers.—Simplex Electric Co., Ltd.

Finchley.—Electricity Committee. Accepted. Mercury-arc rectifier equipment (£4,452).—Hewittic Electric Co., Ltd. Switchgear (schedule prices).—A. Reyrolle & Co., Ltd. Balancer sets (schedule prices).—Electric Construction Co., Ltd.

Hull.—Hospital Committee. Accepted. Electric lighting installation at mental hospital extension (£130).—C. F. Proctor.

Manchester.—Health Committee. Accepted. Electric incubator for Monsall Hospital.—C. Hearson.

Education Committee. Accepted. Electrical installation at Styall infants' school.—S. H. Heywood & Co., Ltd.

Housing Committee. Accepted. Electrical installations at Council houses.—E. M. Evans & Son, Ltd.; H. C. Taylor & Co.

Town Hall Committee. Accepted. Alterations to electrical equipment at Central Library.—A. E. Sudlow & Co., Ltd.

Electricity Committee. Accepted. Supplies for twelve months:—Static transformers.—Metropolitan-Vickers Electrical Co., Ltd.; Ferranti, Ltd. Time switches:—Venner Time Switches, Ltd. Instrument transformers:—Ferranti, Ltd. Meters:—Ferranti, Ltd.; Metropolitan-Vickers Electrical Co.,

Ltd.: Aron Electricity Meter, Ltd. Cable:—W. T. Glover & Co., Ltd.; Greengate & Irwell Rubber Co., Ltd.; Metropolitan Electric Cable & Construction Co., Ltd.; Mersey Cable Works, Ltd.; W. T. Henley's Telegraph Works Co., Ltd.

Plymouth.—Estates Committee. Accepted. Electrical fittings for the Guildhall (£393).—General Electric Co., Ltd.

Health Committee. Accepted. Wireless installation at Mount Gold hospital (£185).—Heath & Co.

Reigate.—Surrey Public Assistance Committee. Accepted. Electrical work at the Institution (£4,391).—Read & Partners.

Salford.—Electricity Committee. Recommended. Oil circuit-breakers (£566).—Ferguson, Pailin, Ltd.

Sheffield.—Electricity Committee. Accepted. Transformers.—Electric Construction Co., Ltd.; Brush Electrical Engineering Co., Ltd.; British Electric Transformer Co., Ltd.

Transport Committee. Accepted. Drilling machine with electric motor (£206).—T. Ward, Ltd. Lathe with electric motor and switchgear (£595).—Dean, Smith & Grace, Ltd. Cable.—J. Riley & Sons; Mersey Cable Works, Ltd.; J. Taylor, Dunford & Co., Ltd.; General Electric Co., Ltd. Armature coils.—Manchester Armature Repair Co., Ltd.; Metropolitan-Vickers Electrical Co., Ltd. Assembled commutators.—Metropolitan-Vickers Electrical Co., Ltd.

South Shields.—Electricity Committee. Accepted. 1,000-kV rotary convertor for the electricity works (£2,109).—Metropolitan-Vickers Electrical Co., Ltd.

Forthcoming Events

Electrodepositors' Technical Society.—Wednesday, June 13th. Northampton Polytechnic Institution, E.C.1. 8.15 p.m. "Electricity and the Plater." Mr. J. W. Perring.

Physical Society.—Friday, June 15th. Imperial College of Science and Technology, S.W.7. 5 p.m. Short papers will be read.

Institution of Heating and Ventilating Engineers.—June 18th-20th. Summer meeting at Queen's Hotel, Hastings.

Institution of Electrical Engineers.—Thursday, June 21st. Natural History Museum, S.W. Annual conversazione. (*South Midland Centre*).—Wednesday, July 4th. Summer meeting. Visit to Callender's cable works.

Electrical Contractors' Association.—June 27th-29th. Buxton. Annual conference.

Notes

Electric Water Heaters in France

In the April issue of the propaganda bulletin of the Société pour le Developpement des Applications de l'Electricité and the Société pour le Perfectionnement de l'Eclairage, some particulars are given of the progress made in France and the French Colonies in North Africa in the adoption of electric water heaters. In response to a questionnaire, replies were received from 180 electric supply undertakings which show that the number of electric water heaters increased during last year from 20,573 to 29,667, an advance of over 44 per cent. In Paris the number advanced from 4,200 to 6,325, in the Paris suburbs from 2,450 to 3,347, in the French provinces from 12,673 to 18,372, and in North Africa from 1,250 to 1,722. The majority of the heaters (13,016, or roundly 40 per cent. of the total) were of a capacity of from 13 to 22 gallons, those with a capacity of from 22 to 44 gallons coming next with 10,865, followed by 3,311 of 6½-11 gallons, 1,542 of 55-110 gallons, 1,011 of 5½ gallons, and 605 of 3.3 gallons capacity.

Fatality

A verdict of "Accidental death" was returned at an inquest held at Clipstone last week on the body of William Henry Hall (32), Mansfield, an electrician employed at Clipstone Colliery, who was killed by a shock at 2,200 V while effecting adjustments on the underground electrical apparatus. It was stated that he was attending a h.p. circuit-breaker on which there was a safety device in the form of an isolator switch, which could not be used to turn the power on while the cover was off. Mr. J. Cowan (Electrical Inspector of Mines) suggested that Hall, after completing the adjustments, began another overhaul, and while the cover was off and the circuit "dead" circumvented the safety device by closing the circuit with a screwdriver, thus receiving a fatal shock. He said that the apparatus was in excellent order.

Research on Non-ferrous Metals

The fourteenth annual report of the British Non-Ferrous Metals Research Association which was presented on May 31st at the general meeting shows that the Association has been strengthened in membership during the year both on the producing and manufacturing sides. The number of researches in progress was fifteen and the expenditure was nearly £22,000. The number of major technical inquiries from member firms during the year was 410, compared with 276 similar inquiries in 1932 and 219 in 1931. As the result of researches on the electro-plating of nickel, copper, and chromium, methods have been developed for preventing the porosity which leads in time to the formation of unsightly spots of corrosion, and for obtaining a better adhesion of the deposits. Work on the electro-deposition of tin has shown that sound tin deposits of any desired thickness can be produced; coatings as thin as 1/2,000 in. in thickness on steel have been found to be substantially free from pores.

The new lead alloys originally introduced for cable-sheathing, but which are also proving suitable for domestic water pipes, are attracting a good deal of attention abroad. The report records that negotiations have been successfully concluded for the issue of licences for working the Association patents for these alloys in France, Spain, and Italy, and in the United States. Negotiations for licences in other foreign countries are also in progress. In the past many of the most important investigations carried out on behalf of the Association have been conducted in the laboratories of the National Physical Laboratory, the Research Department, Woolwich, or at universities. The conclusion has now been reached, however, that a better balanced team of research workers could be secured by concentrating much of this work in the Association's own laboratories and this is now being done.

At the I.M.E.A. Annual Dinner, Liverpool, on May 30th
From left to right: Mr. P. J. Robinson (president), Mrs. Robinson, H.R.H. the Duke of York, the Lady Mayoress, the Lord Mayor and Lord Derby

E.A.W. Housecraft Certificates

The second examination for the E.A.W. electrical housecraft certificate was held at twelve centres throughout Great Britain on May 3rd. The total number of candidates who enrolled for the examination was 177; of these 169 sat for the paper, and nine of the successful candidates passed with distinction.

Power-driven Derrick Cranes

A revision of the British Standard Specification for derrick cranes has been completed. The method of calculating the stresses outlined in the addendum sheet circulated in May of last year has been accepted by the makers and users, and it has been incorporated in the present revision together with a number of other modifications. The Building (Amendment) Regulations, 1931, necessitate the reconditioning of cranes constructed prior to October, 1931, to B.S.I. standards as near as is reasonably practicable, and a short paragraph covering cases of this kind has been embodied in the Gearing Clause 26. Copies of this Specification (No. 327, Pt. 1-1934) can be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d. post free.

A New Cure for Toothache

Toothache can be cured by wireless waves, according to Dr. Oartel, of Wilkinsburg, New York. In an address before the Pennsylvania Dental Society, Dr. Oartel said that the germs in diseased teeth can be killed by placing the molar between sending and receiving plates of a simple short-wave set.—*The Wireless World.*

Photo-electric Timing by Philips

The contracts for both the public address installation and the photo-electric timing equipment for the Welsh Harp Greyhound Stadium have been secured by Philips Industrial, the former consisting of microphone, gramophone, and super power speakers. The timing apparatus works as follows: A special projector lamp throws either a visible or an infra-red ray across the path of the greyhound on to the photo-electric cell; this connects up with an ordinary stop watch, which again is connected with the trap in order to set the watch. As soon as the nose of the first greyhound breaks the ray, the beam of light is interrupted and the watch is stopped.

Appointments Vacant

Electrical engineer and manager and station superintendent for Stepney Borough Council.

City electrical engineer for Plymouth.

(See our classified advertisements.)

Makers' Names Wanted

VARIO-FLEX machine.
SYNDAN die.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. A. G. Connell, the author of the article "'Nursing' the Consumer," published on page 838 of this issue, was until recently resident engineer for Messrs. Merz & McLellan, in charge of Central Electricity Board contracts in the South-East England Scheme (Northern Area). His work included the supervision of the main Thames crossing at Dagenham.

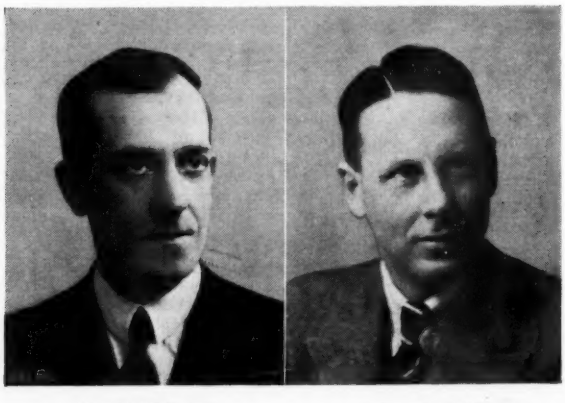
Mr. A. G. Connell

Scotts' Old Boys.—On June 2nd Mr. G. Newton Russell, the retired chief electrical engineer of Shoreditch, entertained in his garden on the banks of the Thames at Wraysbury a party of men who were associated together under him as apprentices in the works of Ronald Scott at Acton in the 'eighties. There were present: Messrs. B. Arkell, R. J. Elmhirst, J. W. Hame, F. N. Haward, A. B. Lillywhite, H. Marryat, R. E. Meade, E. C. Moyes, A. N. Rye, J. R. Smith, and W. E. Toy. Many other of the "old boys" sent congratulatory letters. Mr. H. Marryat, the secretary, 40, Hatton Garden, E.C.1, would be pleased to hear from those who have not received communications regarding the gatherings of this Society.

Mr. E. G. Okell, city electrical engineer of Plymouth, is retiring from that position on July 1st.

Mr. H. Brierley, A.M.I.E.E., who has been appointed chief technical assistant in the Croydon Corporation Electricity Department, received his early training with the Corlett Electrical Engineering Co., Wigan. During the war he was on active service in the Navy, and subsequently took a three-years' course in electrical engineering at King's College, University of London. He afterwards held various appointments on the main staff of the Lancashire Electric Power Co., and five years later joined the head office staff of the Yorkshire Electric Power Co. He went to Croydon as deputy distribution engineer at the beginning of 1930, and was promoted to distribution superintendent in March, 1933.

Mr. H. C. Spence, who has been appointed distribution engineer in the Croydon Electricity Department, received his training with the Dundee Corporation Electricity Department, and was then for six years on the staff of the Glasgow Corporation Electricity Department. In 1926 he joined the Yorkshire Electric Power Co. as an assistant engineer, and



Mr. H. Brierley Mr. H. C. Spence

was subsequently district engineer for the North-East area. He was selected as engineer and manager of the Holmfirth Urban District Council Electricity Department in 1929, and resigned that appointment in May, 1933, to become deputy distribution engineer at Croydon.

Mr. J. Garland, of Pinner, has been appointed superintendent at the electricity works of the Maidenhead Corporation.

Mr. A. V. Cross, who has for the past three years been with the Walsall Corporation electricity undertaking in a development capacity, is leaving shortly to take up a position with Reading Corporation Electricity Department.

Mr. A. F. Berry, who for many years has been closely identified with the electric cooker business, has relinquished his directorship of the British Electric Transformer Co., Ltd., of which he was deputy chairman, in order to devote further time to the development of the business of Tricity Cookers, Ltd., of which he is chairman.

I.E.E. Council Nominations.—The following have been nominated by the Council of the Institution of Electrical Engineers for the vacancies which will occur on the Council on September 30th next:—President: Prof. W. M. Thornton. Vice-presidents: Mr. W. E. Highfield and Lt.-Col. A. G. Lee. Hon. treasurer: Mr. F. W. Crawter. Ordinary members of the Council: Messrs. N. Ashbridge, J. R. Beard, V. Watlington, and W. J. H. Wood (full members of the Institution), Messrs. A. H. M. Arnold and C. L. J. B. Nadaud (associate members), and Brig.-Gen. R. F. Legge (companion).

Sir Hugo Hirst, Bt., is created a baron in the list of the King's Birthday Honours. He is, as our readers know, chairman and joint managing director of the General Electric Co., Ltd. He was one of the founders of the G.E.C. in the year 1889, and during the past forty-five years he has had the satisfaction of seeing the business grow from very small beginnings until it has become the largest British electrical manufacturing company in the world. To-day it has assets of £12,000,000 and controls fifteen associated or subsidiary companies, in the management or control of which he still takes an active part. Sir Hugo, who was born in 1863, commenced his business career with the electrical industry in London at the age of eighteen. In 1900 he became managing director of the company, and in 1910 its chairman. He has two daughters. His only son died in 1919, and the heir is his grandson, Hugh Harold, who was born in that year. Sir Hugo has rendered many public services as an authority on industrial affairs, both to the electrical and allied industries themselves and to the State. He is a recognised authority on international trading and organisation. It will be recalled that he was one of four prominent business men and experts who went to Australia as a Government Commission in 1928 to confer with the Commonwealth Government and the leaders of commerce on the development of Australian resources and other matters of mutual economic interest to Great Britain and the Commonwealth. Many committees have counted him among their members. These include the Committee on Industrial Research, the Prime Minister's Trade and Employment Panel, the Advisory Committee of the Board of Trade, the Committee on the Amendment of Industrial Insurance, and the Committee on the Marketing of Coal. In the labour movements of comparatively recent years he has been a prominent member of the joint industrial conference of trade union leaders and representative groups of employers and a member of the Melchett-Turner Conference. He is a past-president of the British Electrical Development Association, the Incorporated Society of British Advertisers, the Institute of Fuel, the British Export Society, and the Decimal Association. He has shown a special interest in educational problems and the welfare and recreation of his employés. For many years he was a keen and successful competitor at the G.E.C. sports meetings, and his keenness as a sportsman brought him considerable success on the Turf with his comparatively small stable, and he won the Two Thousand Guineas with Diolite in 1930. He was Master of the Glaziers' Company for two years. His country house is Fox Hill, Earley, near Reading.

[*Elliott & Fry*

Sir Hugo Hirst, who has been raised to the peerage

The electrical industry, with which he has had a continuous personal attachment during the whole of his business career, will join with us in congratulating Sir Hugo upon the high and fully merited distinction that is now conferred upon him.

The Birthday Honours List also includes the names of Lord Wakefield, governing director of Messrs. C. C. Wakefield & Co., Ltd., who is elevated to a viscounty; Sir John Reith, Director-General of the British Broadcasting Corporation, who receives the G.B.E.; and Ald. T. E. Higham, chairman of the Mid-Lancashire Electricity Advisory Board, of the North-Western District Council (No. 3), for the Electricity Supply Industry, who is knighted. Mr. E. Noel, H.M. Senior Trade Commissioner in South Africa, receives the C.M.G.; Mr. F. T. De Monte, chief engineer, Indian Posts and Telegraphs, becomes a C.I.E.; and Mr. Loughnan St. L. Pendred, editor-

in-chief of the *Engineer*, is awarded the C.B.E. (Civil Division). The O.B.E. has been conferred upon Mr. L. C. P. MacA. Grant, divisional engineer of Telegraphs, Patna, and Mr. C. V. Magill, Director of Posts and Telegraphs, Somaliland Protectorate; and the M.B.E. has been awarded to Mr. H. Trayfoot, Inspector of Telegraph and Telephone Traffic, G.P.O., and Mr. W. B. Benham, Superintendent of Traffic, London Telephone Service.

Mr. W. C. P. Tapper, whose resignation, to which brief reference was made in last week's ELECTRICAL REVIEW, was accepted by the Stepney Borough Council on May 30th, has held the position of chief executive officer of the Stepney electricity undertaking for over thirty-five years. He was responsible under Mr. Arthur Wright, who was then the consulting engineer, for preparing the preliminary plans and specifications and for supervising the laying down of the original plant and network. He was present at the inaugural ceremony in December, 1899, and under his management the undertaking has reached its present successful position and magnitude. Mr. Tapper commenced his professional career with Messrs. Woodhouse and Rawson as a pupil at their Cadby Hall works. He then became associated with the wiring department of the Brush Electrical Engineering Co., carrying out wiring work in Hanley, Staffs, prior to the commencement of the Hanley undertaking for which the Brush Company was responsible. His next appointment was under Mr. Arthur Wright during the early days of the Brighton Corporation Electricity Department where he remained for a period of five years, until in 1899 he transferred to the Whitechapel Board of Works, the predecessor of the Stepney Borough Council.

Mr. W. C. P. Tapper

Mr. Tapper is a member of the Institution of Electrical Engineers, a past president of the Incorporated Municipal Electrical Association and is hon. secretary of that Association, though as mentioned by us last week Mr. G. Porter, of Worthing, is temporarily acting for Mr. Tapper in this capacity at present. He is a past president of the Associated Municipal Electrical Engineers (Great Britain and Ireland). He was for many years chairman of the Engineering Committee of the Conference of Local Authorities owning Electricity Undertakings in Greater London and in that capacity he was responsible for pressing the claims of the Fulham site as being eminently suitable for a super-station. He is a member of the National Consultative Committee of the Central Electricity Board and has been on the Council of the British Electrical Development Association since its inception. In 1912 Mr. Tapper gave evidence before the Special L.C.C. Committee on Electricity Supply, submitting proposals for the development of electricity supply in the Greater London area and in 1917 he advanced similar proposals to the Board of Trade Electric Power Supply Committee. Apart from his engineering work, he has specialised in the commercial development and distribution of electricity supply and particularly on the subject of tariff-building. Mr. Tapper intends to take a few months' rest after which he will act in a consultative capacity in connection with the electricity supply industry. The ELECTRICAL REVIEW feels that in wishing Mr. Tapper a speedy and complete recovery it expresses not merely its own hopes but those of a host of electricity supply men in different parts of the world.

An advertisement inviting applications for the post of electrical engineer and manager at Stepney, at a salary of £1,050, rising by annual increments of £50 to £1,700, appears in this issue.

Mr. Howard Marryat, M.I.E.E., M.I.Mech.E., has accepted nomination for the presidency of the Electrical Contractors' Association for 1934-35. This will be Mr. Marryat's second term as president; he occupied the position in 1922-23. Mr. Marryat is very well known throughout the electrical industry and has contributed to our pages from time to time. His latest article, on "Lift Control," appeared in last week's special issue.

The B.I.F. Management Board.—The following are among those who have been reappointed to the board of management of the Birmingham Section of the 1935 British Industries Fair: Messrs. G. P. Achurch (Parker, Winder & Achurch, Ltd.), J. Belliss (Belliss & Morcom, Ltd.), P. F. Bennett (J. Lucas, Ltd.), J. F. Davies (Radiation, Ltd.), C. E. Greener (W. W. Greener, Ltd.), C. Holland Harper (John Harper & Co., Ltd.), H. H. Humphries (city surveyor and engineer), E. J. Jennings (Birmingham Electric Supply Department), T. J. Kennedy (B. Mason & Sons), T. R. Martin, W. P. G. McGeoch (Wm. McGeoch & Co., Ltd.), J. F. Parker (British Rolling Mills, Ltd.), R. C. Rodgers (Buncher & Haseler, Ltd.), A. W. Smith (secretary of the Birmingham Corporation Gas Department), and Ald. H. J. Sayer (J. Lucas, Ltd.).

Mr. J. Gibson Jarvie, chairman of the United Dominions Trust, is chairman and managing director of Credit for Industry, Ltd., with the following as directors:—Messrs. R. B. Pearson, C. Bruce Gardner, D. Carmichael and Captain C. E. Benson.

Mr. G. W. Turner, A.M.I.E.E., has left the Manchester sales staff of the English Electric Co., Ltd., and is now representing the Plessey Co., Ltd., of Ilford, in connection with its general electrical and mechanical work in the Manchester area.

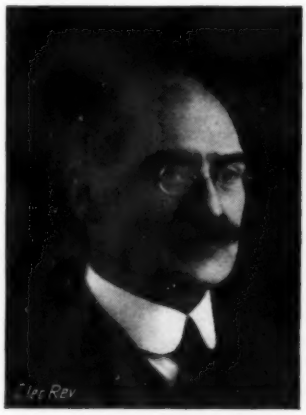
Professor W. M. Thornton

The President-elect of the Institution of Electrical Engineers

TO a large body of electrical engineers Armstrong College and Professor Thornton, D.Sc., who has been nominated by the Council of the Institution of Electrical Engineers as next year's President, mean the same thing. To many more his name is associated with much of the technical progress made since the beginning of this century in Newcastle-on-Tyne and on the North-East Coast.

William Mundell Thornton was born on February 16th, 1870, and was educated at the Liverpool Institute. After eight years of works experience he studied at University College, Liverpool, where he achieved honours in Schools Physics and Engineering (Victoria), and in 1895 became University Scholar in Physics. A year later he was appointed senior lecturer in engineering at University College, where he remained until his appointment in 1898 as lecturer in electrical engineering at the Durham College of Science (later Armstrong College), Newcastle-on-Tyne, where he now holds the chair. In 1920 he was made a Member of the Order of the British Empire.

Professor Thornton has often shown his faith in the motto of the University of Durham, of which Armstrong College is a part—*Mens agitat molem*—by lecturing to a wider audience than the students there. His stimulating expositions of abstract fundamental ideas on electricity have, in many cases, proved as interesting to the intelligent layman as to the engineer. A series of lectures delivered shortly after the war on the theory of transmission brought home in a striking fashion to many older electrical men in his audience what revolutionary changes time had wrought even in their comparatively short careers in the conception of the foundations of their craft. Then there was his Faraday Lecture in 1931, which we all remember.



[*Jas. Bacon & Sons*

Professor W. M. Thornton

To the world at large Professor Thornton is probably best known for his researches on the ignition of gases and the safe use of electricity in mines. Recognition of this part of his activities was accorded him in the award of the Kelvin Premium for Research in 1931 and of the Greenwell Gold Medal of the North of England Institute of Mining and Mechanical Engineers. Other notable works of practical utility have been his experimental work in dielectrics and, recently, on high-voltage measurement. The result of his investigations in various subjects are contained in some seventy papers which he has communicated to the Royal Society, the Institutions of Electrical, Mechanical, and Mining Electrical Engineers, the Physical Society and the *Philosophical Magazine*.

Professor Thornton has always identified himself with the wider interests of his profession, having occupied many honorary positions, such as chairman of the Newcastle Local Centre of the Institution of Electrical Engineers in 1905-6 and again in 1921-2, and president of the Association of Mining Electrical Engineers in 1921.

We desire to join with all other electrical engineers in Great Britain and the Dominions in offering our congratulations to Professor Thornton on the honour that crowns his career.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Mersey Mouldings, Ltd.—Private company. Registered May 31st. Capital, £3,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical and allied accessories, mouldings of synthetic resins, bakelite and other plastic materials. &c. The directors are: G. Sawyer, 71, Upper Parliament Street, Liverpool, and three others. Registered office: 43, Seel Street, Liverpool.

Wilson Refrigerators, Ltd.—Private company. Registered May 31st. Capital, £1,000 in 995 7 per cent. cumulative preference shares of £1 each and 100 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers of and dealers in refrigerators, radio and television instruments and apparatus, electrical goods and appliances, gramophone sets and accessories, &c. The subscribers are: H. C. Wisenden, 114, Hillside Gardens, High Barnet, and H. B. Ravilious, 31, Lavender Gardens, S.W.11. Solicitors: Zeffertt & Heard, 17, Coleman Street, E.C.4.

Kingsway Radio, Ltd.—Private company. Registered May 31st. Capital, £6,000 in 5,000 10 per cent. preference shares of £1 and 20,000 ordinary shares of 1s. each. Objects: To acquire the business of loud-speaker manufacturers, known as Daedalia Co., and the business of manufacturers of wireless apparatus known as the Holborn Instrument Co., both carried on by Gordon Osmond at 5/9, Dane Street, High Holborn, W.C.1. The subscribers are: A. E. Bailey, 27, Champion Grove, S.E.5, and A. E. Smith, 8, Kitchener Road, Thornton Heath. Secretary: A. E. Smith.

Industrial Broadcasting Corporation of Ireland, Ltd.—Private company. Registered in Dublin on May 28th. Nominal capital, £15,000 in £1 shares. Objects: To purchase, erect, acquire and operate wireless transmitting or broadcasting stations as duly authorised by law in Irish Free State, to conduct or transmit broadcasting programmes on its own behalf or concerts sponsored by others, &c. The first directors are: P. O'Reilly, "Clifton," Coliemore Road, Dalkey, Co. Dublin, and G. Shanks, 1, Upper Ormond Quay, Dublin.

E. & H. Lewy, Ltd.—Private company. Registered June 2nd. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers, repairers and hirers of and dealers in electrical fittings and plant, apparatus, accessories, equipment and components, radio sets, &c. The directors are: H. Lewy and Miss Elsie Lewy, both of 1, Buckland Crescent, Hampstead, N.W.3. Registered office: 33, Lonsdale Road, West Kilburn, N.W.6.

Carlisle Hire Purchases, Ltd.—Private company. Registered June 2nd. Capital, £1,000 in £1 shares. Objects: To carry on the business of financing the purchase of refrigerators, cookers, electrical appliances and all other domestic fittings, utensils, &c. The first directors are: R. C. Saint, 22, Lowther Street, Carlisle; and H. W. Mawson, Bank Chambers, Bank Street, Carlisle. Registered office: 22, Lowther Street, Carlisle.

Langton & Young, Ltd.—Private company. Registered May 30th. Capital, £600 in £1 shares. Objects: To carry on the business of manufacturers and repairers of and dealers in electrical and mechanical apparatus and accessories, wireless sets, radio-gramophones, &c. The first directors are: F. Young and Mrs. Mildred Young, both of Langton House, Century Road, Rainham, Kent. Registered office: 36, High Street, Rainham.

Glen's Patents & Holdings, Ltd.—Private company. Registered May 30th. Capital, £100 in £1 shares. Objects: To acquire letters patent, *brevets d'invention*, concessions and licences in connection with inventions relating to the reproduction of sound, and to carry on the business of manufacturers of and dealers in radio apparatus, sound reproducers, gramophones and cinematographs and parts thereof, electrical and mechanical engineers, &c. The subscribers are: A. W. Penny and N. P. Lindsay, both of 18, Austin Friars, E.C.2. R. R. Glen is permanent governing director. Solicitors: Slaughter & May, 18, Austin Friars, E.C.

Lamberts Co. (Sidcup), Ltd.—Private company. Registered May 28th. Capital, £1,000 in £1 shares. Objects: To adopt an agreement with F. V. Lambert, and to carry on the business of electrical contractors and retailers of electrical apparatus and accessories, &c. The first directors are: F. V. Lambert, 31, Harmer Street, Gravesend, Kent, and two others. Secretary: A. J. Bray. Registered office: 5, Wellington Parade, Blackfen Road, Sidcup, Kent.

Returns of Electrical Companies

Kniveton Cable Works, Ltd.—Issue on May 8th, 1934, of £1,000 debentures, part of a series already registered.

Brownie Wireless Co. of Great Britain, Ltd.—A. J. Foster, 37, Walbrook, E.C.4, ceased to act as receiver on May 11th, 1934.

M. P. A. Wireless (1930), Ltd.—E. M. Parker, 10, Ashley Place, S.W.1, ceased to act as receiver and manager or May 29th, 1934.

Rational Electrical Vehicles, Ltd.—Capital, £1,500 in £1 shares. Return dated December 31st, 1933. 950 shares taken up. £950 paid. Mortgages and charges, nil.

Lincoln Radio Relay Service, Ltd.—Capital, £6,000 in 4,000 shares of 5s. and 5,000 shares of £1 each. Return dated December 30th, 1933 (filed February 19th, 1934). All shares taken up. £5,000 paid. £1,000 considered as paid. Mortgages and charges at date of return: £2,300 debentures. Issued January 5th, 1934: £700 debentures.

Wolf Safety Lamp (Hiring) Co., Ltd.—Capital, £8,400 in £1 shares. Return dated December 29th, 1933 (filed January 26th, 1934). All shares taken up. £6,400 paid. £2,000 considered as paid. Mortgages and charges, nil.

Wireless Telephone Co., Ltd.—Capital, £1,000 in £1 shares. Return dated January 11th, 1934. All shares taken up. £333 paid. £667 considered as paid. Mortgages and charges, nil.

Radio Rentals, Ltd.—The nominal capital has been increased by the addition of £400 beyond the registered capital of £11,000. The additional capital is divided into 2,000 ordinary shares of 4s. each.

East Yorkshire Relay Co., Ltd.—The nominal capital has been increased by the addition of £500 of £1 ordinary shares beyond the registered capital of £500.

Thorne's Radio & Battery Service, Ltd.—Debenture dated May 17th, 1934, to secure £800, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: A. Thorne & Constance G. Thorne, Bay View, Blackpill, Glam.

J. Orton (Electricians), Ltd.—Capital, £4,000 in 500 preference and 3,500 ordinary shares of £1. Return dated December 31st, 1933 (filed March 6th, 1934). 51 preference and 2,282 ordinary shares taken up. £2,333 paid. Mortgages and charges, nil.

Keating & Miskin, Ltd.—Capital, £2,500 in £1 shares. Return dated October 20th, 1933 (filed May 23rd, 1934). All shares taken up. £1,250 paid, £1,250 considered as paid. Mortgages and charges nil.

Riverside Manufacturing Co., Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1933 (filed April 13th, 1934). 100 shares taken up. £100 paid. Mortgages and charges nil.

Electrical Appliances (Blackpool), Ltd.—F. Outhwaite, Flatts Mills, Walton-le-Dale, Preston, was appointed receiver and manager on February 20th, 1934, under powers contained in debenture dated April 10th, 1928. (Notice filed May 22nd, 1934.)

Electro-Metallurgical Research Co., Ltd.—The nominal capital has been increased by the addition of £50 beyond the registered capital of £100. The additional capital is divided into 200 "B" ordinary shares of 5s.

Westford Radio, Ltd.—The nominal capital has been increased by the addition of £300 in £1 ordinary shares beyond the registered capital of £100.

Murex Welding Processes, Ltd.—The nominal capital has been increased by the addition of £78,750 in £1 ordinary shares beyond the registered capital of £71,250.

Ionlite, Ltd.—Satisfaction in full on May 2nd, 1934, of three debentures dated June 22nd, 1933, July 6th, 1933, and December 15th, 1933, and registered July 12th, 1933, July 12th, 1933, and December 20th, 1933, securing £1,000, £1,000, and £1,300 respectively.

Deed of variation and charge dated May 2nd, 1934, supplemental to three charges dated October 14th, 1932, December 12th, 1932, and February 27th, 1933, collaterally securing £15,021 4s. 9d. Property charged: Benefit of the certain hire-purchase and/or deferred payment agreements. Holders: F. V. Trust, Ltd.

Electric Mirrors, Ltd.—Satisfaction to the extent of £150, on April 27th, 1934, of debentures authorised November 23rd, 1928, and registered December 5th, 1928.

Edward Dewhurst, Ltd.—Satisfaction in full on May 2nd, 1934, of mortgage dated September 1st, 1926, and registered September 22nd, 1926.

Henshall Bros., Ltd.—Capital, £1,500 in £1 shares. Return dated June 15th, 1933 (filed May 12th, 1934). 1,000 shares taken up. £100 paid, £900 considered as paid. Mortgages and charges nil.

Electric Services (Liverpool), Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1933 (filed April 19th, 1934). 152 shares taken up. £152 paid. Mortgages and charges nil.

A.B. Electric Co., Ltd.—Capital, £5,000 in 3,000 preference and 2,000 ordinary shares of £1. Return dated December 31st, 1933 (filed April 16th, 1934). 350 preference and 500 ordinary shares taken up. £850 paid. Mortgages and charges nil.

Gaskell & Garraway, Ltd.—Capital, £1,000 in 400 preference and 1,600 ordinary shares of 10s. Return dated July 31st, 1933 (filed May 8th, 1934.) 80 preference and 1,315 ordinary shares taken up. £322 10s. paid on 80 preference and 565 ordinary shares, £375 considered as paid on 750 ordinary shares. Mortgages and charges nil.

Naldor Brothers & Thompson, Ltd.—Two mortgages on properties in (1) Hackney, and (2) Dalston, both dated May 8th, 1934, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

Neonrent, Ltd.—Debenture, dated May 8th, 1934, to secure (a) all moneys not exceeding £600, which the chargee may be called upon to pay to Lloyds Bank, Ltd., under a guarantee, and (2) all moneys not exceeding £600, which the chargee may be called upon to pay to Barclays Bank, Ltd., in respect of advances to A. M. E. Sherwood, Ltd., under a guarantee. Property charged: The company's undertaking and property, including uncalled capital. Holder: H. Plotkin, 16, Beechcroft Avenue, N.W.

A. M. E. Sherwood, Ltd.—Debenture, dated May 8th, 1934, to secure (a) all moneys not exceeding £600 which the chargee may be called upon to pay to Barclays Bank, Ltd., under a guarantee, and (b) all moneys not exceeding £600, which the chargee may be called upon to pay to Lloyds Bank, Ltd., in respect of advances to Neonrent, Ltd., under a guarantee. Property charged: The company's undertaking and property, including uncalled capital. Holder: H. Plotkin, 16, Beechcroft Avenue, N.W.

City Notes

The Sphere Investment Trust, Ltd., held its annual meeting on June 1st, when Sir George A. Touche, Bt. (chairman), who presided, said that there had been a considerable change-over in the distribution of their investments as between bonds and preference and ordinary shares. In the early stages of recovery it had been the high-grade fixed-interest stocks which first rose in value. As recovery proceeded the preference and, finally, the equity stocks took up the running. They had adapted their policy to harmonise with the normal rhythm of the trade cycle. The past year had opened with the United States going off the gold standard. That had involved the company in heavy loss of income on all bonds expressed in American currency. Means had been found, however, to compensate for that loss in other directions. The trust's German bonds seemed fated to involve it in a substantial loss of income in the current year. Their investments in Germany amounted to 4.9 per cent., but they bore a high rate of interest. A more potent factor was likely to be the benefit to be derived from the use of the £250,000 of debenture money, all of which had been invested by the opening of the current year. The outlook might be regarded as moderately favourable provided this country continued to adhere to orthodox finance and eschewed temptations to spend its way back to prosperity.

The Telephone & General Trust is to hold an extraordinary meeting and separate meetings of the different classes of shareholders on June 12th to consider a scheme for an alteration in the capital structure of the company. It is proposed to convert 100,000 of the preferred ordinary into "A" ordinary shares, and the remaining 350,000 preferred ordinary into ordinary shares ranking *pari passu* with the 300,000 existing ordinary shares. After payment of the preference dividend profits available for dividend will be applied in payment of non-cumulative dividends of 7 per cent. first on the ordinary shares and secondly on the "A" ordinary shares, the two classes ranking *pari passu* for any further distribution above 7 per cent. The effect of the alterations proposed is that the preference shareholders will have a fixed proportion of 27½ per cent. of all votes, the ordinary shares taking 22½ per cent. and the "A" ordinary shares 50 per cent. Should the ordinary dividends fall below 5 per cent per annum in any two consecutive years, then until a 5 per cent. dividend has again been paid on the ordinary shares, the "A" ordinary will have only 25 per cent. of all votes, and the votes of the ordinary shareholders will be increased to 47½ per cent.

The Chloride Electrical Storage Co., Ltd.—Presiding at the annual meeting on June 1st, Mr. W. S. Naylor (chairman) said that new uses were found almost every week for their "Keepalite" emergency lighting equipment. In a highly technical business like theirs research was of vital importance. They must constantly be developing original designs, discovering new materials and manufacturing processes, and improving methods of sales presentation and publicity, to keep themselves in the van of the trade. This policy they intended to pursue. Regarding the future, the general outlook was brighter than when they met last year, but real prosperity could not come to the country as a whole without a large increase in the export trade. As a company they depended upon a large volume of business. Their revenue was derived from a small average rate of profit on a large turnover. They increased their turnover last year and looked forward to a further increase during the current year.

The Madras Electric Supply Corporation, Ltd., reports a gross revenue of £252,329 for 1933, as compared with £260,365 for 1932. The number of consumers connected increased from 8,530 to 9,197, and the sales of electricity from 29,595,764 to 30,253,601 kWh, the decline in revenue being attributed to the reduction in the tariff for lighting and fans and other concessions which came into operation on July 1st last. The net profit was £77,269 (against £77,602), and it is proposed to pay a final ordinary dividend of 5½ per cent., maintaining the distribution for the year at 8 per cent., and leaving £25,757 to be carried forward.

The Tramway Co.'s working showed an available balance, including the amount brought in, of £21,505, and a dividend of 5 per cent. (same) is again paid on the ordinary shares.

Richard Johnson & Nephew, Ltd., held their annual meeting on May 31st, when Lt.-Gen. Sir Walter Campbell, who presided, said the reduction in profits was mainly due to there having been little or no increase in the selling prices of their products, while the costs of all their raw materials had increased. There was no improvement in the non-ferrous side of their business. With the completion of the main grid scheme, orders for aluminium wire had practically ceased, and the demand for copper wire was very much below normal, notwithstanding the moderate price and consequent low capital cost of the raw material required for any large installation. They were, however, hopeful that now the economy restrictions had been lifted municipalities and other public bodies would go ahead with their postponed extensions.

The Ever Ready Co. (Great Britain), Ltd., held its annual meeting on May 31st. Mr. M. Goodfellow (chairman and managing director), who presided, said that sales during the year increased by 10 per cent. in volume, and only 1 per cent. in value, the fall in value being due to severe competition. They had made offers to the shareholders of two competitor companies; they would be able to effect considerable savings in the costs of production of the two businesses, and also in sale and overhead charges, and these benefits would accrue almost at once. A number of their new ventures were showing promising signs of contributing profitably to the business. The sales for April and May had been more than maintained in comparison with a year ago.

The Electric Construction Co., Ltd., reports a loss for the year ended March 31st last of £14,215, as compared with a profit of £12,845. A sum of £15,373 is brought in and £6,256 is transferred from reserve, making £21,629. After deducting the loss for the year and paying the preference dividend a balance of £3,019 is carried forward. The amount remaining in the general reserve fund is £145,000. The report states that a reduced demand for electrical machinery was again experienced during the year, but a marked improvement in demand has occurred during the past few months. Meeting: June 12th.

The Telsen Electric Co. reports a loss of £50,839 for the nine months ended March 31st, of which £33,000 is due to writing down and adjustment of stock. At the time of the retirement of Mr. Macnamara, it was agreed to reduce the debt due from the company to him by £42,641. This is carried to profit and loss account, leaving a net deficit of £8,198. With the debit of £14,489 brought in, the total debit on profit and loss is £22,687, which is charged against the issued capital of £160,000. The directors state that the financial position has been improved by obtaining increased facilities from bankers, by the introduction of new moneys, and by deferment of certain liabilities until the spring of 1935. The present directors took over full control of the company in March on the retirement of Mr. Macnamara as managing director.

Radiovisor Parent, Ltd., reports a net loss for the year ended March 31st last (after charging a loss of £5,234 made by a subsidiary) of £16,782, as compared with £13,529 for the preceding year. Interest in subsidiary and associated companies amounts to £87,916. The auditors express a doubt as to the value of the holding of £83,135 in the Foreign and Colonial company, as well as the patents, trade marks, &c., valued at £30,000. The report states that the litigation forced by the Foreign and Colonial company has seriously effected the business and finances of the parent company. Proposals for the introduction of fresh capital will be submitted at a meeting following the annual meeting on June 20th, which, if approved, will enable the company to carry on business.

The Imperial Continental Gas Association.—In the course of his speech at the annual meeting held on June 1st, Sir Thomas Royden (chairman) said the countries in which they operated. France, Belgium, Holland and Czechoslovakia, had been passing through a period of severe industrial depression. The increase of 4 per cent. in the sales of electricity was not good, as compared with the increases of 10 to 12 per cent. which were quite usual in this country. Their slow rate of development was attributable mainly to a decrease in sales of h.p. current, which touched their peak in 1929. Since that date there had been a disconcerting slump. Some improvement, owing to increased activity, was registered in the early months of 1933, but that recovery had not been maintained.

Glenfield & Kennedy, Ltd., report a profit for the year ended March 31st last of £29,851, as compared with £12,078 for 1932-33, to which is added £47,582 brought in, making £77,432 available. It is proposed to pay a final ordinary dividend of 5 per cent., making 7 per cent. for the year (against 4 per cent.), and to carry forward £49,745. The report states that the amount of work in hand shows an increase over that in the previous year, and there seems a reasonable prospect of the company maintaining its position during the current year.

Telephone Rentals, Ltd., reports a net profit for the year ended May 31st last of £59,258, as against £58,147 for 1932-33. It is proposed to pay a final dividend of 4 per cent., making 7½ per cent. for the year (against 7 per cent.), and to carry forward £14,186. The report states that all the British and Australian subsidiary companies have worked at a profit with one exception.

The Electrical Finance and Securities Co. reports a net profit for 1933 of £30,767, as compared with £30,813 in the preceding year. It is proposed to pay a final ordinary dividend of 5 per cent. and a bonus of 2½ per cent., maintaining the distribution for the year at 12½ per cent., leaving £16,547 to be carried forward.

Edmundsons' Electricity Corporation, Ltd., has declared a final ordinary dividend of 4 per cent., making 7 per cent. for the year (same).

The Electric Furnace Co., Ltd., has announced a final ordinary dividend of 4½ per cent., making 7 per cent. for the year (against nil).

The Nigerian Electricity Supply Corporation, Ltd., has declared a first dividend of 3 per cent. on the preferred ordinary shares.

Stocks and Shares

TUESDAY EVENING.

THE falls which occurred last week in the list of shares in Home electricity supply companies have been partially recovered in a few cases, though in the majority an unusual degree of depression continues to be an outstanding feature. The Provincial and Scottish companies were the first to recover, rallies having taken place in the ordinary shares of the Yorkshire Electric, North Eastern Electric, Midland Counties, Bournemouth & Poole, and Clyde Valley Companies. In the London list, Metropolitans at 51s. 3d., and County of London at 55s. 9d., are both better. The remainder of the list continues to suffer from the weakness that overtook the list a fortnight ago. The Central Electricity Board is endeavouring to secure powers that will enable it to supply current direct to big users, and the fear on the part of shareholders is that if Parliament gives the necessary assent, the provincial companies, more particularly, are likely to sustain a heavy drop in revenue. This fear receives little heed in the Stock Exchange market, where the prospects of the provincial companies are regarded as being as promising as ever they were. The prices of the shares have been advanced to high levels owing to the impression that, with business expanding, new capital must be required and that this will be raised through the offer of share issues at prices affording a bonus to existing shareholders.

New Issue Considerations

This is a consideration to which reference has been made here on many previous occasions. The recent issue by the

County of London Company of 4 per cent. £1 preference shares, at the high price of a guinea, is read by some folk as giving a hint of what might possibly take place in other companies that want to raise money. Instead of ordinary shares being offered at a tempting figure, the companies might take advantage of the prevailing plethora of capital, and issue preference shares at a price giving little scope for possible appreciation. This is, perhaps, a small matter, but investment is on the alert nowadays to observe the slightest indication of what is likely to happen in the near future, and, as we have already mentioned here, the disposition is rather to look for a quiet deflation in capital value than for further expansion in the price of fixed-interest stocks and shares.

Edmundson's are lower at 38s. 9d. British Power and Light eased off to 18s. 9d., Electric Finance & Securities to 64s. The 6 per cent. preference shares of the Scottish and the Shropshire companies are slightly down, at 30s.

Cables and Wireless

After the sharp shake-out which occurred last month in the prices of Cables & Wireless stocks, a few courageous buyers put in an appearance, the result being that the 5½ per cent. preference recovered to 68¾, the "B" ordinary stock also being harder at 7¼. Globe Telegraph & Trust ordinary advanced sympathetically to 9¼. Assuming that Cables & Wireless continues to pay no more than the present half rate of 2¾ per cent. on its 5½ per cent. preference stock, the yield comes to a shade over 4 per cent. on the money. This is a return which would attract speculative investment attention at a time when Stock Exchange prices were buoyant, but which for the moment offers no great attraction. Indeed, the tendency is for prices in most markets round the House to give way. From the point of view of the holder of stocks and shares in British companies, the disturbances on the Continent and in the United States should constitute, indirectly, bull points, insomuch as such troubles have the effect, as a rule, of concentrating investment demand upon home securities.

Victoria Falls

Victoria Falls ordinary at 6¼ show a very small reaction. The next dividend declaration is awaited with earnest attention. If it should be the same as before, making 20 per cent. for the year, the present price of 6¼ would look high, the yield working out to little more than 3 per cent. on the money. But were there to be an offer of new shares at a low price, this would help to justify the current quotation.

Whitehall Electric 7¼ per cent. preference are unchanged at 21s. The chairman's speech at the recent meeting made an illuminating exposition of the unpleasant manner in which foreign exchange can affect the earnings of a British-managed undertaking.

London Passenger Transport

The fall last week of 2 points in London Passenger Transport "C" stock has been followed by a further decline of similar extent, lowering the price to 74½. It will be a good thing when the dividend, whether it be up to expectation or not, is declared, and the suspense thereby ended, in regard to the return to be obtained from the first year's working of the Board. Some of the senior stocks are marked ex dividend. Allowing for the deductions, no particular change has occurred. Central Electricity issues retain their previous values, and the market for other public boards' stocks remains noticeably firm, notwithstanding the heaviness that has crept into the prices of a good many gilt-edged stocks domiciled in the same market. British Electric Traction deferred is 30 points down, at 575.

Dollar Stocks

Amongst the reasons assigned to the depression apparent amongst industrial shares in the Stock Exchange markets may be mentioned the idea that Americans have recently been large sellers of those shares in which they had acquired interests. The rumour sounds fantastic and far-fetched, but the weakness of most dollar stocks lends the report an air of possibility. American Telephones are exceptional, with a gain of 2 points. Brazilian Tractions dropped back to 8¼. The non-compliance of this country with the Washington demand for payment of money on the 15th of this month had no special influence over prices.

Equipment and Manufacturing

General Electric ordinary slipped back to 40s. Electric Constructions are again 1/8 down, at 11s. 3d., on the issue of the report, showing a net loss of £14,200 for the year lately ended. British Aluminium ordinary went back to 28s. 3d., upon the new proposals concerning the capital. Arons dropped to 52s. after being 53s. 3d., and Reyrolles gave way to 52s. 6d. Ever-Ready shares at 29s. show a few pence loss, despite the chairman's cheerful statements at the annual meeting. Henleys are 1/8 lower at 5⅞, but buyers came in for the company's preference shares, causing a rise in the price to 5¼.

The iron and steel group is quiet. The newly-issued United Steel Companies' shares rose to 7¼d. premium before reacting to 3¼d. premium. The rubber market is quiet and uninteresting. Stock Exchange business has subsided to an extent which enabled the House to fulfil all engagements that this week imposed at Epsom.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. June 5.	Rise or Fall.	Yield. £ s. d.
Bournemouth and Poole	1	15	15	75/0	+⅛	4 0 0
Brompton Ordinary	1	7	7	33/6	—1/—	4 3 7
Charing Cross Ordinary	1	7	7	34/6	—	4 1 2
Chelsea	1	7	7	34/–	—	4 2 4
City of London	1	7½	7½	35/–	—	4 5 9
Clyde Valley	1	7	7	38/9	—	3 12 4
County of London	1	10½	10½	55/9	+9d.	3 15 4
Edmundson's 7% Pref.	1	7	7	34/–	—	4 2 4
Elec. Dis. Yorkshire	1	9	9	47/6	—	3 16 0
Elec. Supply Corporation	1	11	11	73/9	—	2 17 9
Kensington Ordinary	1	7	7	34/6	—6d.	4 1 2
Lancs Light and Power	1	7	7½	36/3	—	4 2 8
London Electric	1	7	7	34/6	—	4 1 2
Metropolitan	1	10	10	51/3	+⅛	3 18 2
Midland Counties	1	7	7	36/3	+⅛	3 17 2
Mid. Elec. Power	1	8	8	40/–	+⅛	4 0 0
North Eastern Electric Ordinary	1	6	6	31/9	+9d.	3 15 0
Do. 7% Pref.	1	7	7	35/–	—	4 0 0
Northampton	1	10	10	53/9	—	3 14 3
Notting Hill 6% Pref.	10	6	6	14½	—	4 2 9
North Met. Elec. Ordinary	1	10	10	61/3	—	3 5 3
Do. do. 6% Pref.	1	6	6	31/6	—	3 16 2
St. James' and Pall Mall	1	7	7½	36/–	—6d.	4 3 4
Scottish Power	1	8	8	38/9	—	4 2 6
South London	1	7	7	37/–	—	3 15 9
Westminster Ordinary	1	7	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/–	—	7 2 10
Yorkshire Elec.	1	8	8	47/6	+⅛	3 7 6

PUBLIC BOARDS.

		1931.	1932.			
Central Electricity, 1950–70	Stock	5	5	116	—	4 6 2
Do. 1955–75	,,	5	5	117	—	4 5 6
Do. 1951–73	,,	4½	4½	109xd	—	4 1 1
Do. 1963–93	,,	—	3½	97	—	3 10 8
London & Home Counties, 1955–75	,,	4½	4½	110	—	4 1 10
London Passenger Transport, A	,,	—	4½	119½	—	3 15 4
Do. do. B	,,	—	5	123½	—	4 1 0
Do. do. C	,,	—	—	74½	—2	—
West Midlands Joint Elec. 1948–68	,,	—	5	114	—	4 7 9

TELEGRAPH AND TELEPHONES.

American Tel. & Tel.	$100	9	9	112½	+2	8 0 0
Anglo-Am. Tel. Pref.	Stock	6	6	114	—1	5 5 5
Do. Def.	,,	1½	1½	28	—	5 7 2
Cables & Wireless 5½% Pref.	,,	2¾	2¾	68½	—2	4 0 4
Do. A. 7½% Ord.	,,	Nil	Nil	16	—	—
Do. B. Ord	,,	Nil	Nil	7½	+⅛	—
Globe Tel. and T. Ord.	10	Nil	2½	9½	+⅛	2 14 0
Do. do. Pref.	10	6	6	12¼	—	4 13 4
Great Northern Tel.	10	20	20	39	—1	5 2 7
Marconi-Marine	1	10	7½	31/3	—	4 16 0
Oriental Telephone Ord.	1	12	12	3½	—	*3 16 10

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	3	—	—
British Electric Traction Df. Ord.	,,	5	5	575	—30	—
Do. do. Pref. Ord.	,,	8	8	157½	—	5 1 7
Brazil Traction	100	—	—	8¾	—¼	—
Brit. Columbia Elec. Rly. Pfe.	Stock	5	5	105	—	4 15 3
Mexico Trams, 5% Bonds	—	5	5	24½	—	20 8 0
Mexican Light Common	100	Nil	Nil	8	—	—
Do. 7% Pref.	100	7	7	7½	—	—
Do. 1st Bonds	—	5	5	49½	—	10 10 6
Victoria Falls Ord.	1	15	20	6½	—⅛	3 1 6
Yorkshire (West Riding)	1	2½	5	23/9	—	4 4 0

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	4	3	17/3	—6d.	3 9 7
Do. Pref.	1	8	8	32/6	—	4 18 6
Babcock & Wilcox	1	9	6	2	—	3 0 0
British Aluminium Ord.	1	5	5	28/3	—1/0	3 11 0
British Insulated Ord.	1	15	15	68/9	—	4 7 3
Brush Ord.	Stock	Nil	Nil	35	—	—
Callender's	1	15	15	3⅛	—	5 0 0
Do. 6½% Pref.	1	6½	6½	30/9	—	4 6
Crompton Parkinson Ord.	5/–	22½	12½	27/–	—	—
Do. 8% Pref.	1	8	8	32/6	—	4 18 6
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	11/3	—⅛	—
Enfield Cable Ord.	1	25	20	86/3	—	4 13 0
English Electric	1	Nil	Nil	6/3	—	—
Do. do. Pref.	1	Nil	Nil	10/–	—	—
Ever Ready	5/–	35	35	29/0	—6d.	6 0 8
Ferranti Pref.	1	7	7	27/6	+6d.	5 1 10
G.E.C. Pref.	1	6½	6½	31/3xd	—	4 3 2
Do. Ord.	1	8	8	42/–	—⅛	4 0 0
Henley's	1	30	30	5⅞	—⅛	5 2 0
Do. 4½% Pref.	5	4½	4½	5½	+½	4 1 9
India-Rubber Preferred	1	—	—	17/6	—	—
Johnson & Phillips	1	5	5	23/3	—	4 6 0
Siemens Ord.	1	6½	4	17/–	—	4 14 2
Telegraph Construction	£1	Nil	Nil	21/3	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1932

22175. "Television transmission method." M. Von Ardenne. August 20th, 1931. (410147.)

27448. "Electric cut-out arrangements for polyphase transformers." British Thomson-Houston Co., Ltd., H. E. Cox and C. A. C. Hillyer. October 3rd, 1932. (410086.)

27589. "Frequency-discriminating electric circuits." Electrical & Musical Industries, Ltd., and H. L. Oura. October 4th, 1932. (410119.)

27748. "Electromagnetic apparatus for producing vibrating or reciprocating motion." T. Jones, R. Barker and J. F. Gill. October 6th, 1932. (410154.)

28650. "Fluorescent screens." Electric & Musical Industries, Ltd., and J. W. Strange. October 13th, 1932. (410159.)

29655. "Single-pole fuse-switch." W. J. Wells and A. Milne. October 18th, 1933. (410202.)

30881. "Globes or shades for electric lighting." General Electric Co., Ltd., and J. H. Jones. November 2nd, 1932. (410,089.)

30885. "Electric motor-starting systems." British Thomson-Houston Co., Ltd. November 2nd, 1931. (410090.)

31046. "Control of alternating-current lighting circuits." British Thomson-Houston Co., Ltd. November 3rd, 1931. (410105.)

31387. "Cord-circuit repeaters for use in telephone systems." Telefonaktiebolaget L. M. Ericsson. November 10th, 1931. (410108.)

31579. "Imitation fuel." Premier Electric Heaters, Ltd., and A. E. Newton. November 9th, 1932. (Cognate application 6611/33.) (410123.)

31682. "Fluorescent screens." Telefunken Ges. für Drahtlose Telegraphie. November 9th, 1931. (410114.)

31762. "Road-traffic control systems." Siemens & General Electric Railway Signal Co., Ltd., and F. A. Edwards. November 10th, 1932. (410167.)

31831. "Electric cable installations." Cablon, Ltd. November 19th, 1931. (410124.)

31904. "Electric cables." Standard Telephones & Cables, Ltd. November 13th, 1931. (410138.)

31966. "Light-sensitive apparatus." Electric & Musical Industries, Ltd., and W. F. Tedham. November 11th, 1932. (410142.)

32056. "Thermionic oscillation generators." Marconi's Wireless Telegraph Co., Ltd., and W. A. Appleton. November 12th, 1932. (410182.)

32202. "Automatic telephone systems." W. D. Corlett. November 14th, 1932. (410191.)

32529/30. "Metal-clad electric switchgear." A. Reyrolle & Co., Ltd., and A. Allan. November 17th, 1932. (410206/7.)

32608. "Time-signalling apparatus." T. F. O'Neill. November 18th, 1932. (410211.)

32755. "Flexible metallic strips suitable for repairing the protective screen or armouring of a cable." Callender's Cable & Construction Co., Ltd., and E. Clare. November 19th, 1932. (410213.)

33145. "Means for protecting electric cables and the like laid underground." N. S. Tennant and F. A. Orchard. November 23rd, 1932. (410219.)

33894. "Wireless receiving apparatus." W. Baggally. November 30th, 1932. (Cognate application 387/33.) (410225.)

33964. "Totalisators." Ericsson Telephones, Ltd., and F. Limb. December 1st, 1932. (410226.)

34435. "Transformers and method of making same." W. F. Gakle. December 5th, 1932. (410230.)

34674. "Electric tumbler switches." C. L. Arnold, R. W. Dowsett and M. K. Electric, Ltd. December 7th, 1932. (410232.)

35353. "Radio-electric musical instrument." Musique Electro-Synthetique. January 28th, 1932. (410238.)

35447. "Apparatus for obtaining the sound-lag correction for a sound locator for locating an aircraft." A. H. Stevens (Sperry Gyroscope Co., Inc.). December 14th, 1932. (410239.)

35500. "Electricity meters." R. W. Jolly, N. B. Coop and British Electric Meters, Ltd. December 14th, 1932. (410240.)

1933

965. "Electrical heating apparatus." Steatit-Magnesia Akt.-Ges. January 13th, 1932. (410260.)

1207. "Systems of electric welding." International General Electric Co., Inc. January 15th, 1932. (410262.)

1770. "Automatic dynamo regulators." Chance Bros. & Co., Ltd., J. H. Abbink-Spaink, and F. W. G. Beaumont. January 19th, 1933. (410264.)

2206. "Electric discharge vessels." Naamlooze Vennootschap Molybdenum Co. January 22nd, 1932. (410268.)

2911/12. "Radio and other high-frequency receiving systems." Marconi's Wireless Telegraph Co., Ltd. January 29th, 1932. (Divided application on 2911/33.) (410275/6.)

3034. "Electric incandescent lamps for vehicle headlights." C. R. Sirot. January 31st, 1933. (410277.)

3120. "Electrically operated devices for controlling or regulating the level of liquid or other flowing materials." Eversheds & Vignoles, Ltd., and J. C. Needham. February 1st, 1933. (410278.)

3405. "Electric toasters." Landers, Frary & Clark. February 11th, 1932. (410279.)

5269. "Electric timepieces." P. J. Robinson and A. J. Huckle. March 31st, 1933. (410287.)

16720. "Inductance coils." H. Vogt. March 8th, 1933. (410327.)

17411. "Conversion of alternating current of a given periodicity and phase number to another periodicity and phase number." Akt.-Ges. Brown Boverie et Cie. June 17th, 1932. (410329.)

18334. "Mirror arrangements for use in the transmission or reception of electrical waves." Naamlooze Vennootschap Machinerieen-En Apparaten Fabrieken. July 8th,1932. (410336.)

18439. "Vapour apparatus for electric discharges." Elin Akt.-Ges. für Elektrische Industrie. July 23rd, 1932. (410337.)

18540. "Television and the like." Fernseh Akt.-Ges. June 30th, 1932. (Addition to 31043/32.) (410338.)

18839. "Apparatus for producing pulsations in alternating-current." British Thomson-Houston Co., Ltd. July 1st, 1932. (410340.)

19139. "Arrangement for the parallel operation of discharge lamps." W. Tellmann. July 6th, 1933. (410341.)

19399. "Multiple fuse." British National Electrics, Ltd., and M. Lipsey. July 8th, 1933. (410343.)

19720. "Automatic electric time-switch." G. B. Stern. July 12th, 1933. (410346.)

20823. "Electric discharge apparatus." British Thomson-Houston Co., Ltd. July 23rd, 1932. (410352.)

24226. "Electric switches." C. D. Sutton. August 31st, 1933. (410372.)

24491. "Thermionic valve apparatus." Telefunken Ges. für Drahtlose Telegraphie. September 3rd, 1932. (410374.)

25771. "Circuit arrangements for transmitting high or intermediate frequency oscillations by way of low-frequency multiphase networks." Naamlooze Vennootschap Philips Gloeilampenfabriken. October 20th, 1932. (410388.)

26004. "Thermionic valve oscillation generators." Telefunken Ges. für Drahtlose Telegraphie. September 20th, 1932. (410389.)

29754. "Electric switches with a free-handle automatic release." Felten and Guilleaume Carlswerke Akt.-Ges. October 26th, 1932. (410409.)

30395. "Terminal connectors and insulators for the leading-in conductors for the electrodes of metal-vapour rectifiers." Siemens-Schuckertwerke Akt.-Ges. November 1st, 1932. (410410.)

33805. "Electric condensers for mounting on electric motors." English Electric Co., Ltd., R. D. Ball and L. Roberts. December 1st, 1933. (410425.)

34038. "Piezo-electric devices." Compagnie Générale de Télégraphie sans Fil. December 3rd, 1932. (410429.)

1934

1329. "Electric signalling and/or remote-controlling systems." Automatic Electric Co., Ltd., T. R. Rayner and P. F. Gunning. November 10th, 1932. (Divided application on 31866/32.) (410128.)

11207. "Radio-electric musical instrument." Musique Electro Synthetique. January 28th, 1932. (Divided application on 35353/32.) (410451.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from May 30th :—

Cuitometer. No. 550054. Class 8. An electrical conductivity measuring apparatus used in the control of sugar boiling by measuring the saturation of the syrup.—The Sugar Manufacturers' Supply Co., Ltd., 2, St. Dunstan's Hill, E.C.3.

Rentertainment REL (lettering and design). No. 550373. Class 8. Radio-telephonic receiving sets and parts thereof.—Rentals, Ltd., 3, Balham Road, Edmonton, N.9.

A Large Welder

SOME new plant installed by Imperial Chemical Industries, Ltd., entailed the making of a large number of resistance-welded joints in alloy-steel tubing with a sectional area of 30 sq. in. A butt welder was designed by British Insulated Cables, Ltd., to meet the requirement. This machine is fully automatic after the tubes have been clamped in position, when the actuation of a small control switch starts a sequence of operations until the current is switched off and the weld is finally consolidated.

The total weight of the welder is 26 tons, its overall dimensions being 15 ft. 6 in. long by 8 ft. 3 in. wide by 8 ft. 6 in. high. The 600-kW transformer has a primary voltage of 440, with tappings to give twenty-four secondary voltages.

The upsetting pressure, which is applied by means of hydraulic rams, may be varied from ten to fifty tons for the final value, and the preheating pressure is also variable to suit the section of material being welded. The left-hand slide has vertical and horizontal adjustments; to obtain correct alignment of the abutting ends of the tubes this adjustment can be made whilst the tube is clamped in position. This slide is also adjustable to enable the required gap between the main contacts to be set for different diameters of tubes.

The right-hand saddle is operated for preheating, flashing and final upsetting by motor-driven cams and hydraulic rams. The machine can be set so that the ends of the tubes may be preheated for any desired period before flashing and the final upsetting pressure may be applied at any predetermined time after flashing has commenced. Automatic locking switches prevent any two operations inadvertently coming into action simultaneously.

Delivery time was of the utmost importance. From commencement to setting to work, the job took eighteen weeks. The correct settings were quickly obtained and the third weld made was adjudged perfect.

Flanges can be welded on to tubes up to 30 sq. in. section and, by a different arrangement of clamps, 14 in. diameter tubes can be welded. An illustration of the equipment appears on page 833.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashtead (SURREY).—Houses (686) and shops, Woodfield Farm Estate; W. J. Hobbs, Colston Avenue, Carshalton. Houses (45), Old Rectory Estate; Bridgewater Bros.

Banff.—Swimming pool; D. Malcolm, burgh surveyor, Town House.

Billingham.—Houses (150); Stephen Coates, Ltd., builders, North Ormesby.

Birmingham.—Houses (816), Cherry Orchard Estate; Ideal Benefit Society. Houses (318), King's Norton (£107,000), and shops and firemen's flats, Fire Station site (£22,000); city engineer. Factory, Harford Street and Smith Street, for Deutsch & Brenner, Ltd., 44, Harford Street (£40,000); H. W. Weedon, architect, 84 Colmore Row.

Blyth.—Houses (52) by direct labour; L. Leeper, borough engineer.

Boston (LINCOLNSHIRE).—Chapel, Brothercroft Road (£5,000), with electrical work; Dale & Son, builders, 35, Highgate, Cleethorpes.

Bournemouth.—Reconstruction of East Beach Café (£15,000); borough surveyor.

Bradford.—Houses (32), Northdale Avenue and Southfield Road; Northdale Estates, Ltd. builders, 12, Hawes Mount, Little Horton. Houses (77), Sellerdale Hall Estate, Westfield Lane and Whitehall Road; H. Emmott, Ltd., builders, 14, King's Arcade, Market Street. Houses (22), Charles Avenue, Thornbury Road; C. F. Napper, builder, 91, Station Parade, Harrogate.

Bridlington.—Central Senior School, near Old Town; H. Snowden, clerk of works.

Camberley (SURREY).—Houses (26), Barossa; H. Porteous, engineer and surveyor, Municipal Buildings.

Carlisle.—Houses (106); P. Dalton, city engineer, 18, Fisher Street.

Chelmsford.—Sewage works (£35,236); Crowley Russell & Co., Ltd.

Cheltenham.—Houses (20), Jersey Avenue; Goddard & Hunt.

Crewe.—Houses (42); borough surveyor.

Darlington.—Houses (30), Saltersgate; L. W. Evans, builder, Coniscliffe Road. Houses, Seal Road; W. Lyall, architect, Victoria Road.

Dartford.—Houses, Heath Lane Estate; borough surveyor.

Dudley.—School, Blower's Green, for Borough E.C.; Butler, Jackson and Edmonds, architects, 24, Bennett's Hill, Birmingham.

Dumfries.—Business stores, High Street (£4,000), for Montague Burton, Ltd., Leeds.

Durham.—Council school extension, Wearhead; county architect.

Eastbourne.—Bandstand and shelter, Grand Parade (£29,000); borough surveyor.

Edinburgh.—Houses (38) for the Edinburgh Housing Association, Ltd., 27, Alva Street; A. H. Mottram, architect, 59, Frederick Street.

Enfield.—Houses (25), Clay Hill; E. W. Palmer. Houses (210), Enfield Town Estate; W. Goodchild & Co. Houses (132), Napier Road; New Ideal Homesteads, Ltd. Factory, Bridge Works, Southbury Road; C. R. Belling. Central fire station (£25,000); U.D.C. surveyor.

Essex.—Houses (23), Brentwood Mental Hospital. Schools, Parsloes Avenue, Dagenham (£47,093), Rayleigh, Hornchurch (£36,000), and Collier Row, for County E.C.; J. Stuart, county architect, Chelmsford. School, Chingford (£10,900); Hosking & Son, builders, Leigh-on-Sea.

Forehoe.—Houses (24), Wymondham; R.D.C. surveyor.

Galston.—Houses (36), electrical work, Gateside Road, burgh surveyor.

Glasgow.—Bank premises, Bothwell and Wellington Street, for the Commercial Bank of Scotland, Ltd., Edinburgh; J. Miller, architect, 15, Blythswood Square. Institute, Tollcross Road, for the Y.M.C.A.; J. Easton, architect, Blythswood Square.

Guildford.—Houses (38), Shepherd's Farm Estate; G. Harms. Girls' senior school, for Borough E.C.; T. R. Clemence & Co., architects. Senior boys' school; Hodgson, Dixon & Quick, architects.

Hampshire.—Casual wards, Fareham Institution, for County P.A.C.; clerk, Winchester.

Hanley.—Reconstruction of business premises, with electric lift; McIlroy's (Hanley), Ltd.

Hemel Hempstead.—Houses (20), King's Langley; R.D.C. surveyor.

Henley-on-Thames.—Houses (67); borough surveyor.

Hertfordshire.—School, Addiscombe Road, Watford, for County E.C.; A. E. Prescott, county surveyor, Hatfield.

Hetton-le-Hole (DURHAM).—Houses (133); U.D.C. surveyor.

Hull.—Extensions, Brandesburton institution (£13,252) for East Riding and York Joint Mental Deficiency Board; clerk, Beverley.

Ilkeston.—Factory, Park Road; Beardesley & Widdowson.

Inverness.—Bank extensions (£5,500); British Linen Bank, St. Andrew Square, Edinburgh.

Irish Free State.—(Co. TIPPERARY).—Secondary school, Templemore, for the Rev. Brother O'Brien; E. F. Ryan, Incorporated architect, 88, O'Connell Street, Limerick.

Kidderminster.—Works extensions, Green Street; Childema Carpet Co.

Lanchester.—Houses (38); R.D.C. surveyor.

Leatherhead.—Public offices, Kingston House Estate (£10,485); Cropley Bros., builders, Epsom.

Leeds.—Houses and flats (796), Gipton Estate; Housing Director.

Liverpool.—Houses (300) and shopping centre, Park Lane, Netherton; Sefton Building Co., Aintree Village.

London.—(BLACKHEATH).—Cinema, Old Dover Road, for M. Sampson, Shooters Hill Road; Messrs. Richardson, Streatham, builders. (FINCHLEY).—Houses (39), Abbots Gardens; Comben & Wakeling, Ltd. (GREENWICH).—Four-storey block of flats, Azof Street (£7,610), by direct labour; borough surveyor. (ST. JOHN'S WOOD).—Block of flats, Stockleigh Hall, Regent's Park; Wimperis, Simpson & Guthrie, architects. Shops and flats, Wellington Road and Circus Road; S. B. Caulfield. (ST. MARYLEBONE).—Flats (32), Fisherton Street Estate (£17,750); H. V. Ashley, architect. Block of flats, 44-54, Maida Vale; F. Scarlett. (ST. PANCRAS).—Newspaper works, Wilson Street and Gough Street; Daily Sketch and Sunday Graphic, Ltd. (SOUTHGATE).—Houses (20), Ashridge Gardens; F. F. Tomlin. Houses (38), Seafield Road; E. Pollex. Houses (10), Yew Tree Close; New Ideal Housing Co. Flats (76), High Street; H. St. John Harrison, architect. (WANDSWORTH).—Extensions, Springfield Hospital (£4,598); Higgs & Hill. (WIMBLEDON).—Club house, Park Estate (£10,141); Robertson & Cameron.

Maidstone.—Houses (90); E. S. Moss, Ltd., builders, Cricklewood, London.

Malton (YORKS).—Houses (48), £13,560; Jacques & Greeves, builders, Doncaster.

Manchester.—Rehousing, Red Bank area (£42,000); city architect.

Mansfield.—Houses (60), Crompton Road; Radford & Jenkins. Baths extensions (£17,500); borough engineer. Bazaar stores, for Marks & Spencer, Ltd., London.

Middlesex.—Secondary school, Broadfields Park Estate, Edgware, for County E.C. Schools, Green Road, Southgate, and extensions to County Hospital, Hillingdon (£81,250), and Redhill Institution, Edgware (£251,300); county architect.

Newburn-on-Tyne.—Houses (25), Bells Close and Lemington; J. A. Wetherley, surveyor.

Newport (I.O.W.).—Houses (200), electrical work; W. M. Alderslade, Stratton & Millgate, architects.

Newton Abbot.—Cinema, Wolborough Street, for the Tower Cinema Co.; secretary.

Northampton.—Houses (1,200), Delapre Estate; J. Blythe. Houses (37), Fullingdale Road; J. E. Lucas. Houses (75), Highlands Estate; Chowns, Ltd. Factory extensions, Guildhall Road; Phipps & Son, Ltd. Municipal offices, Fish Street (£4,389); W. E. Cockerill & Sons. Ten shops, Broadmead Avenue; H. Martin, Ltd.

Plymouth.—Baths, Hoegate Street (£4,500), and washhouses, Stonehouse; city engineer.

Portsmouth.—Extensions, St. Thomas' Cathedral Church (£70,000); Sir Charles Nicholson, architect.

Preston.—School, Moor Park (£15,000), for Borough E.C.; borough surveyor.

Radcliffe.—Equipment of works, Milltown Street (electrical work), for W. Spencer, Georgiana Street, Bury, Lancashire.

Reigate.—Extensions, Poor Law Institution (£74,790); C. Miskin & Sons, Ltd.

Rochester.—Schools for City E.C.; Read & McDermott, architects. Public baths (£6,600); W. Law, city surveyor.

Rugby.—Telephone exchange, for H.M. Office of Works, King Charles Street, London, S.W.

Salisbury.—Reconstructing infirmary (£85,000), for Governors; Mr. Hamp, architect.

Seaham.—Houses (62); E. Rutter & Sons, builders. Houses (84); W. Tomlin, builder.

Sheffield.—Houses (105), Bishopscourt Road; A. Ramsay. Houses (20), Button Hill; Cussins, Ltd. Houses (22), Glen View Road; Wright & Walton. Houses (34), Helmton Road; M. J. Gleeson, Ltd.

Shipley.—Elementary school; U.D.C. surveyor.

Southend-on-Sea.—Cinema, conference hall, ballroom, &c. (£340,000), for the Westcliff Pier Co., Ltd.; Leolyn Hart, managing director, St. Martin's Lane, London, W.C.

South Molton.—Cinema, New Road (£4,000), for South Molton and District Cinema Co., Ltd.; L. Woodhouse, secretary.

South Shields.—Houses (70), for Col. R. Chapman; Henderson Bros., builder, Smith Street. Houses (256), West Harton (£71,594); J. Clark & Son, builders, New Seaham.

Spilsby (LINCS).—Houses (30); R.D.C. surveyor.

Stockton-on-Tees.—Houses, Appleton Road; A. McLeod, Ltd., builders, Bridge Street, Thornaby.

Stoke-on-Trent.—Houses, Trent Vale; Workmen's Housing Association. Hospital laundry extension; E. Jones, architect and city electrical engineer.

Sunbury-on-Thames.—Houses (38), Green Lane; A. J. Buttress, acting U.D.C. surveyor.

Sunderland.—Houses (400); E. Hitchens, R.D.C. surveyor.

Surrey.—School (384 places), Kenley, and technical college, Stoke Park, Guildford, for County E.C.; secretary, Kingston-on-Thames.

Sutton & Cheam.—Laboratory, &c., Worcester Park sewage purification works; W. Hedley Grieves, surveyor.

Tain.—Houses (20), electrical work; J. H. Hinton Gall & Son, architects, 13, Lombard Street, Inverness.

Teddington.—Memorial Hospital extensions (£6,650); Roy Gibson, Ltd., builders, Priory Lane, Roehampton.

Todmorden.—Houses (36), Lower Laithe; J. A. Dufton.

West Riding.—Extensions to Conisborough senior schools (£11,200), for County E.C.; director of education, Wakefield.

West Sussex.—Senior school, Lancing, for County E.C.; C. G. Stillman, county architect, North Street, Chichester.

Wiltshire.—School, Amesbury, for County E.C.; director of education, Trowbridge.

Worthing. — Extensions, Worthing Hospital (£12,000); governors.

Wythenshawe (LANCASHIRE).—Factory for J. Crampton & Co., Ltd., 31, Princess Street, Manchester; H. S. Fairhurst, architect, Brown Street, Manchester.

York.—Junior school, Tang Hall Estate, for E.C.